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Tel: +91-11-24629994-7 | Fax: +91-11-24626149 | Email: [info@cii.in](mailto:info@cii.in) | Web: [www.cii.in](http://www.cii.in)

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# Overview of the Dialogue



**Hybrid**  
Mode



**16**  
Partners



**12** Thematic Sessions and  
**5** Plenary Sessions



**500+**  
Registrations



**100+**  
Speakers



Participation from  
**30** countries

# Our Partners

## Technical Partner



## Prime Partner



## Diamond Partner



## Gold Partner



## Silver Partner



## Corporate Partner



## Associate Corporate Partner





# Executive Summary

Access to nutritious, affordable, and adequate food is a fundamental human right. However, more than 345 million people worldwide face high levels of food insecurity. With nearly a third of the global population lacking access to a nutritious diet, they increasingly suffer from the double burden of malnutrition. Our planet and ecosystems also suffer from the widespread effects of climate change, ranging from droughts and floods to hurricanes and large-scale forest fires. Furthermore, millions of smallholder farmers, food chain workers in the informal sector, and small and medium enterprises are unable to derive decent incomes and livelihoods from Food Systems. This limits progress towards achieving the Sustainable Development Goals (SDGs) of ending hunger, food security and improved nutrition, sustainable food production, and better health and wellbeing for all. The development of sustainable food systems is thus critical for achieving all key SDGs by 2030.

Being the B20 secretariat, CII organized the Global Dialogue on Food Systems Transformation and Post Harvest and Logistics summit in 2023, with the objective of finding pathways towards implementing food systems transformation to ensure sustainable production, food security and nutrition for the global family and to outline the priorities and defining actionable goals under the B20 umbrella. These multi-country, multi-sectoral dialogues were important for systemically and sustainably addressing the complex issues the world is currently facing.

The Food Systems approach calls for an aligned and coordinated action that is required between different stakeholders across the value chains including individual farmers, consumers, government, private sector companies and a large part of the civil society.

The Dialogues looked at the production system, biodiversity, soil health and all other constituents that contribute to the production and consumption of food. This calls upon the industry players to work with a sense of responsibility and accountability towards creating new products which are not just great for our taste buds, but also nutritious and affordable for the people, sustainable for the planet, and contributes for a prosperous livelihood.

Food Systems Transformation aims to redesign the way our food is produced, consumed, and distributed in a more nutritious, sustainable, and equitable manner. “Unlike production and market approaches, food systems adopt a holistic and multidimensional approach to address the complex challenges within agriculture and the food sector.” This enables the achievement of the SDG goals through the integrated lens of People, Planet, and Prosperity.

Under the lens of people, the B20 dialogues revolved around the themes on nutrition and food safety. The health of the next generation is critically dependent on the health of adolescents to ensure that new births are healthy. In India, one out of every three children are born underweight (NFHS-5), and if an underweight adolescent girl gives birth, the cycle of poor nutrition leading to even poorer nutrition continues. There are real examples of best practices around the world, such as the Japan school feeding program and the Indian Mid-Day Meal Program, which reaches approximately 120 million children every day. These programs have been effective in not only providing food and nutrition security to adolescents, but also enhancing the quality of school education including attendance and outcomes.

Food systems should also protect our planet by ensuring sustainable ways for our farm and food production. Under the lens of planet, the B20 dialogues focused on the themes of sustainability. Global food systems account for 80 percent of freshwater consumption and contributes to 20 to 30 percent of Global Greenhouse Gas (GHG) emissions. Yet, 70 percent of what is produced is lost or wasted at various stages of the food chain. Efforts have been made to make agriculture environmentally resilient and in harmony with nature. For example, the agri-input industry, which plays a critical role, is working towards sustainable methods of producing food. Extensive research and development efforts are focused towards creating seeds with higher productivity and disease and pest resistance. The introduction of rice herbicides has helped convert transplanted rice cultivation to direct-seeded cultivation, reducing annual water consumption





by 1.7 trillion cubic litres and labour costs by 50 percent. Scientists are also working to develop environmentally friendly biopesticides in India. Urea fertilizer is being converted into small liquid bottles, dramatically changing its transportation and application methods to support our environment. Agri-tech start-ups worldwide are working towards reducing food waste and making agriculture more efficient and resilient.

Affordable and actionable technologies in cold chains can play transformative roles in reducing food losses. Use of thermal energy and biomass waste for operating cold chains is critical for ensuring energy efficiency. Affordable and indigenously developed cooling technologies have been effective in penetrating green cold chain across sectors. The democratization of electricity through the use of solar pumps as energy sources for the agriculture industry, the increasing popularity of drip irrigation, and mechanization are significant steps in this direction. However, there is still a long way to go, given the highly diverse conditions of farmers and farming methods throughout the G20 countries.

Finally, food systems should work towards higher prosperity of the people, including producers, farm laborers, and all others involved in the agriculture and allied sectors 'value chains'. Under the lens of prosperity, the B20 dialogues focused on inclusive businesses and digital technologies from an income perspective, actions aimed at benefiting people and the planet, such as increasing nourishment and reducing food waste, have an opportunity to be redistributed and benefit the producers. While food systems contribute to climate change and natural resource depletion, efforts to reduce emissions and contribute to the larger cause of mitigating climate change can help increase farmers' incomes. This is especially true in the case of evolving carbon markets. This demonstrates that both people and the planet have the opportunity to support the prosperity of producers and laborers involved. Both agricultural technologies and open data architecture play an enormous role in food systems transformation. Although a large part of the increase in farmers' income is led by the government through various welfare programs, research and development, and

extension work, a number of agri-tech innovations have helped augment farmers' incomes. Although business and welfare are opposing concepts, inclusive business models have opened up doors through reciprocal dependency between production systems and consumption systems and can help align value chains. However, this cannot be achieved by the government or civil society alone; it requires a multi-stakeholder partnership between all stakeholders.

With rapidly changing technologies such as Artificial Intelligence, the Internet of Things, among others, food systems transformation requires strong collaborative efforts among academic institutions, industry, government, and entrepreneurship. More importantly, these efforts must be multilateral, cutting across nations and recognized as the collective responsibility of all global citizens. Transforming food systems requires a holistic approach that spans public health and nutrition, sustainability and climate change, and livelihoods and poverty alleviation domains. It requires harmonizing public policy, private sector activity and investments, and civil society actions at different levels. This must consider complex interdependencies, possible synergies, and the likely trade-offs.

The B20 Dialogues saw a participation from more than 30 countries including the major G20 countries. The sessions featured some of very distinguished speakers from the government, private sector and Developmental organisations. The Dialogues were conducted in a hybrid mode and delegates from across 22 countries participated through the CII HIVE platform. The dialogues helped to draw on insights and experiences from speakers spanning 16 countries and has contributed greatly towards prioritizing Food Systems Transformation as an important area for discussion.

Deliberations at the B20 Dialogues have been summarised in this outcome report which is a compendium of perspectives from different stakeholders. This highlights the needs, the stories, and the paths ahead for Food Systems Transformation for ensuring healthier people, a happier planet, and higher prosperity.



# Key Voices



**Mr Stefanos Fotiou**  
Director  
Food Systems Coordination Hub

*“For poverty/hunger and malnutrition eradication, sustainable production and consumption, for natural resources to regenerate and to provide next-gen with healthy future, sustainable food systems are critical”*



*“We need to provide vitamins and minerals through agriculture, as it comes at a much lower cost. Biofortification of crops is a cost-effective way of reducing micronutrient deficiencies”*



**Dr Howarth Bouis**  
Founding Director  
HarvestPlus



**Ms Vinita Bali**  
Chairperson  
CII National Committee on Nutrition

*“The global food systems needs to be reshaped to be more productive, more inclusive of poor and marginalized populations, environmentally sustainable and resilient, and should deliver healthy and nutritious diets to all”*





*"The need to use resources efficiently as this goes back to the producer. An evolving carbon markets will further help supplement farmers' incomes"*



**Mr Sivakumar**

Chairman, CII Core Group on AgTech and Group Head, Agri & IT Businesses, ITC Ltd



*"Sustainable food consumption has significant health benefits. Upto 11 million adults can be saved every year, as it fairly reduces global disease burden"*



**Mr Brent Loken**

Global Food Lead Scientist  
WWF



*"Efficient transport of perishables from producer to consumer, with minimum impact on environment is the need of the hour"*



**Mr Jimmy Washington**

Director  
Sustainability and Cold Chain Development  
Carrier



*"It is the first time that food has been deservedly added to the top nine priority agenda of G20 & B20. Globally, we need to have actionable targets for nutrition & health, just like climate & nature"*



**Ms Diane B Holdorf**

Executive Vice President  
WBCSD





*“Our biggest challenge is harvesting the potential of food and agriculture space which can be curbed by efficient cold chain infrastructure”*



**Mr Ravichandran Purushothaman**

Chairman,  
CII National Committee on Cold Chain and  
President, Danfoss Industries Private Limited



*“Global food systems account for 80 percent of freshwater consumption, contributes to 30 percent of greenhouse gas emissions and yet 70 percent of produce is wasted across the value chains. There is a need to take a food systems approach to tackle this”.*



**Mr Salil Singhal**

Chairman,  
CII Taskforce on Agro Chemicals and  
Chairman Emeritus, PI Industries



*“Healthy and sustainable dietary patterns promote well-being, low environmental footprint with food that is accessible, affordable, safe and equitable and culturally acceptable”*



**Ms Patrizia Fracassi**

Sr Nutrition & Food Systems Officer  
Food & Nutrition Division (ESN), FAO



*“Continuous education and capacity building is important to align farmers for agriculture development and sustainability”*



**Mr B Thiagarajan**

Chairman, CII Task Force on Rural Development  
& Migrant Workforce and Managing Director,  
Blue Star Limited





# Adolescent Nutrition: Need for an Integrated and Sustainable Approach

## ► The Need

The foundation of adequate growth and development is laid before birth, during childhood, and is followed during adolescence. Adolescents are the future generation of any country, and their nutritional needs are critical for the wellbeing of society. Growth during adolescence is faster than at any other time in an individual's life except the first year. Good nutrition during adolescence is critical to cover the deficits suffered during childhood and should include nutrients required to meet the demands of physical and cognitive growth and development, provide adequate stores of energy for illnesses and pregnancy, and prevent adult onset of nutrition-related diseases.

Globally, many of adolescents suffer from physical (chronic malnutrition, anaemia, protein deficiency etc), mental & emotional (effects of social media, peer-pressure, body image) issues, which adversely impacts their health and development. The school environment also has a deep impact on their overall wellbeing. The high rate of malnutrition especially in girls not only contributes to increased morbidity and mortality associated with pregnancy and delivery, but also to increased risk of delivering low birth-weight babies, contributing to the intergenerational cycle of malnutrition. There are many contributing factors predicting the future health state of an adolescent, such as their societal & immediate family ecosystem (traditions, norms etc.); school and peer environment; and immediate food environment.

According to WHO, there are an estimated 1.2 billion adolescents of 10-19 years, around the world. In most developing countries, about 20-25 percent of the population constitute adolescents. They are generally considered a low-risk age group and hence receives scant attention with respect to health-related interventions. However, this approach ignores the fact that many health problems may be avoided later in life by imparting better health related knowledge and adopting healthy lifestyle practices during adolescence.

Despite an abundance of nutrition data for children younger than 5 years, no global nutrition targets exist for older children or adolescents. Adolescence is a particularly nutrient-sensitive time, when young people gain 20 percent and 40 percent of their adult height and weight, respectively. Nutritional status affects the onset of puberty, reproductive health, and risks of non-communicable diseases in adulthood.

The pandemic has further widened the gap between the 'desirable nutritional status' and the 'current nutritional status' of adolescents. Therefore, it is critical for all responsible stakeholders to come together and develop inclusive, cohesive and integrated approaches to identify the nutritional problems and to suggest relevant strategic interventions.

Globally, many adolescents suffer from physical (malnutrition, anaemia, protein deficiency) as well as mental and emotional health issues affecting their overall development. This affects their ability to learn and perform at maximum productivity and increases the risk of poor obstetric outcomes for teen mothers. This further jeopardizes the health of the future of the nation.

Reducing malnutrition amongst children of all ages aligns with the Sustainable Development Goals (SDG) 2.2 of ending all forms of malnutrition. This includes achieving targets on stunting and wasting in children under 5 years of age, and addressing the nutritional needs of adolescent girls, pregnant and lactating women, and older persons. The session on Adolescent Nutrition-Need for an Integrated and Sustainable Approach, deliberated on the situational analysis with respect to adolescent malnutrition status and discussion around strategies and actions for various stakeholders at a global level to ensure healthy future for the adolescents and thereby safeguarding the future of the planet as well.





## ► The Stories

### **Growing concern on malnutrition in adolescents:**

Adolescence is the second most critical period of physical growth in the life cycle after the first year. Adolescent malnutrition impacts the physical, emotional, and cognitive development, of a child, with 25 percent of adult height attained during adolescence. However, inadequate quality and quantity of food remains the prime determinants of nutrition problems. These conditions may be due to household food insecurity, intra-household allocation of food that does not meet their full range of dietary needs, livelihoods insecurity, and lack of nutrition awareness.

There is a triple burden of malnutrition manifested in the form of anaemia, undernutrition and overnutrition. Interventions on addressing malnutrition should focus on all the three aspects, for a long sighted and sufficient approach in tackling with the issue. The disparity specially between undernutrition and overnutrition is a global reality with South Asia being the hub for both undernutrition and anaemia specially among adolescent girls.

### **Disparity amongst developing & developed nations/ Food insecurity's effect on healthy food consumption**

In resource-limited settings, found in both high- and low-income countries, poverty is a key factor driving nutritional inequalities, particularly micronutrient deficiencies. With the COVID-19 pandemic, economically vulnerable households worldwide have experienced increased food challenges and food insecurity. This presents yet another challenge to adolescent nutrition. The World Health Organization recognizes several evidence-informed interventions to improve nutrition during adolescence, ranging from education to supplements, and vary depending on the setting, context and type of malnutrition. For example, a nutrition intervention targeting adolescents in a developed country would look different from one in a under-developed or developing country. However, interventions within either of these countries could also differ, depending on geography (urban or rural) and resources. Socio-economic barriers such as income and education, must also be addressed as interventions at the individual level alone will not help in getting at the root cause of malnutrition.

### **Importance of Food environments**

Food habits are shaped by food availability, affordability, promotion, quality, and safety. They impact food choices and are an important factor in what adolescents eat. Adolescents can face multiple food environments daily between the different settings they encounter such as home, school and workplace. Given the exposure to enhanced social media presence, food choices are impacted directly and hence this needs to be reviewed more thoroughly. In fact, a UNICEF study covering adolescents from 28 countries mentioned that governments should evaluate the various factors that can impact development of healthy eating habits amongst adolescents, with focus on certain barriers to healthy eating, specifically:

- Local food environment – availability of fresh foods which are affordable,
- Social environments including peers and social media which also influences unhealthy eating habits in adolescents.

### **The value of social protection systems**

In countries where a cohesive and integrated systems are in place that include the health systems, education systems, water and sanitation systems etc. have proven to be successful models to ensure a transformative food systems model that eventually work collectively to provide good food habits and services to all adolescents especially in the vulnerable segments.

### **Importance of school meal**

School meal program has proved to be an effective intervention in supplementing the nutrient intake of students especially with respect to vitamins and minerals intake as evident from the Japan school feeding program. In addition to direct impact on improving student's nutritional milieu, this program along with improvement in economic status and agriculture along with healthcare resulted in Japan reaching optimal nutrient balance in diets in 1980s. National Nutrition Program or Shoku-iku in Japan covers issues like appreciation of food and its preparation at farm and home level, respect to traditional culture, environment, food safety and security, thereby making use of school meal as real-life textbook. In India, the midday meal programs have proven to be extremely successful and effective in not only providing food & nutrition security but also enhancing the quality of school education



including attendance and outcomes. The concept of kitchen- gardens and/or school gardens have also contributed positively.

### **Inclusion of adolescents as change makers**

The Lancet series of study on adolescent malnutrition brought out 3 major recommendations namely: Cognizance towards all forms of nutrition, supporting food environment around young people as a driver with schools being critical catalysts to have a positive food

environments and including adolescents as change agents and important stakeholders at important junctions.

### **Targeted Food Fortification as an impactful tool**

Identified, need-based and targeted food fortified programs which have a clear objective, outcome and endpoints can be explored further to reduce the impact of malnutrition amongst vulnerable adolescents.



## **▶ The Path Ahead**

**As B20 recommendations to the G20, the following key takeaways are highlighted:**

### **Need for a clear and targeted approach to include adolescents in various policies and programs:**

- In most developing countries, nutrition initiatives have been focusing on children and women, thus neglecting adolescents. Addressing the nutrition needs of adolescents could be an important step towards breaking the vicious cycle of intergenerational malnutrition, chronic diseases, and poverty.
- To develop country specific data on public health nutrition issues and develop focused targets.

- To identify pockets with adolescent population which are extremely vulnerable to malnutrition and focus on their needs.
- Within the school ecosystems, encourage adolescents' participation in appropriate forums to express their thoughts and food choices.

### **To strengthen the current social security integrated health systems**

#### **The G20 can:**

- Initiate data collection that can be used to make policies and programs that can truly reflect the needs of the adolescents, globally.
- Work towards improving the current scarcity of trained health providers and adolescent-



friendly health centres to deal with the special needs of adolescents are important reasons for the neglect of adolescents in Public Health Programmes.

### To develop targeted, deficiency mapping fortified food programs

#### The G20 can:

- Evaluate the current nutritional deficiencies e.g. anaemia and focus only on need-based intervention.
- Provide a platform for private players academia, community health researchers to co-develop initiatives and programs that can reduce the burden of malnutrition in a systematic and science-based manner.
- To monitor regulatory frameworks that can be supportive of specific and targeted food fortification initiatives.

- Ensure safe food initiatives to avoid adolescents indulging in unsafe/adulterated (fresh) foods.

### To educate and empower adolescents on making informed food choices, with a focus on right to education

#### The G20 can:

- Recognise the role of impactful communication for adolescents via channels such as sports, arts, music, creative theatre in making them more informed about mindful food choices.
- Develop a system to discourage information based on non-scientific or information, which can mislead and create confusion.
- Develop a regulatory model to map developing/enhanced social media for providing useful and correct information and restrict influencing mediums and influencers, with limited or biased knowledge from sharing incorrect information publicly.

### Develop and integrate global policies emanating from “Food Systems transformation” dialogues at local levels

#### The G20 can:

- Encourage a transparent and sustainable food systems approach that can integrate parts of “Farm to Fork” model customized to each country’s specific nutritional needs for their targeted population.
- Avoid a “one solution fits all” approach as health needs, when combined with socio-economic factors can completely change the face of any public health plan. Hence to have a local data and local need-based approach implementation can be critical for specific issues.
- Include partners from across verticals and utilise their strengths, especially in public-private partnerships to work towards facilitating dialogues & negotiations.



### To develop a sustainable food system for ensuring affordable and safe fresh foods,

#### The G20 can:

- Develop systems to ensure availability of subsidized/free food availability beyond cereals.
- Promote more locally available and fresh foods such as millets in India, to enhance more traditional food sources being available that are probably more nutritious.
- Work towards supporting initiatives that are in line with SDG 12.3 “ensure sustainable consumption and production patterns.
- Support CSR project-based interventions (especially from private sectors) to help reduce food wastage and promote food/nutrition availability.





# Food Safety in Informal markets: Affordable and Nutritious Food, Accessible to all

## ► The Need

Informal markets comprise of open markets, wet markets, roadside eateries, and street foods, constituting an important source for affordable, nutritious and accessible food to the middle and low-income sections of the society. These are popular across the globe especially in Asian, African, and Latin American countries. These markets are also crucial for providing livelihood to a large number of people and is capable of contributing effectively to food systems transformation processes by helping achieve the Sustainable Development Goals (SDGs). However, there are high food safety risks involved in these markets, especially for perishable food items, foods of animal origin and freshly produced food. Additionally, many informal food markets operate outside of regulation policies for food safety and hygiene standards lacking economic inputs for

enhancing infrastructure and facilities, thereby creating food safety risks for consumers. Therefore, there is a strong need to address the issues of the informal food sector by using a different approach for enhancing the contribution of this sector towards attaining the SDGs. The objective of this session was to review the prominent models on informal markets operational in India and other low/middle income countries. Incorporation of relevant features could help develop robust global models amenable for application in low- and middle-income countries as well for assuring safety of foods in the informal markets. Some model case studies such as India's Eat Right Movement and Thailand's Street Food Vending which covers informal food markets comprehensively were also discussed.



## ▶ The Stories

**The Eat Right India Programme:** Launched by FSSAI for addressing the issues in informal food markets across India, the program pillared on eat safe, eat healthy and eat sustainable food. This also includes a Food Hygiene Rating and State Food Safety Index scoring.

The State Food Safety Index rating is a five-component objective tool and invaluable in assessing the overall performance of states (FSSAI). Initiatives such as Clean Street Food Hub and Eat Smart Cities Challenge, Hygiene Rating of Small eateries, Eat Right College/Schools Campuses with strong synergistic impact have contributed further on realizing the objectives of Eat Right Campaign. The programme has proved to be a game changer in the Indian context for transforming the food system. It has thus far been implemented in 260 districts, 109 smart cities and at the society level to address all the issues through a 360° holistic approach in India. The proposed Phase 4 will include Eat Right Walkathon, more mobile food testing laboratories along with other initiatives suitable for implementation.

The success stories of this programme (case studies) exemplifying the cities in India showing Leadership in Food Systems Transformation are discussed below.

- **Rourkela:** Approaches like Mission Purnanjali (collection of excess food, checking quality and then distributing it), Aahar Yojana (supplying free food to the aged and destitute), in addition to certification of hospital, educational institutions, public eateries, facilitation of Food storage using decentralized refrigerated storing places (E-Cool Mandi) was indigenously developed and implemented successfully. This provided over 700 street vendors selling vegetables and fruits, mostly women, with Solar-powered cold storage facility to reduce wastage of foods and highly subsidized electric distribution of vehicles. The Mission Shakti was integrated to empower women through gainful activities like food distribution, food preparation by providing credit and market linkages for women. Health food cafes such as millet café and local delicacies are some important women-led/managed gainful activities in the 'food for all' scheme to provide healthy,

safe and affordable meals through Aahar Kendra's. To promote these facilities, state authorities provided adequate training to operators on food safety. Besides, extensive campaigns on food fortification, reducing daily intake of salt, fat, sugar, trans fat-free mela, adulteration checking camps were organized out using radio/TV/ print media. Campaigns such as Street Food Super Star competition, three-day 'Eat Right Street Food Mela' organised recently saw participations of increasing numbers of food vendors with FSSAI certifications. An extensive surveillance drive launched prior to the hockey World Cup ('FIH Men's Hockey World Cup 2023') which concluded recently in Rourkela, testified the success of the food safety endeavours. The authorities have recently planned a complete IT integration of food markets/establishments and decentralizing the main food distribution hubs throughout the city.

- **Indore:** Indore had topped the Eat Right Challenge. Extensive campaigns and activities including walkathons were important in awareness and success of the city in Eat Smart Cities challenge. Drives for BHOG certification throughout the city and effective removal/recycling of wastes proved to be instrumental. Consistent adoption of best practices like garbage disposal, personal hygiene, demarcation of cooking and non - cooking areas, adequate sitting arrangements, lighting and cleanliness were very effective. Besides, use of quality raw materials for food



preparation, giving away used cooking oil, for biodiesel preparation, proper storing of foods and raw materials (refrigerators) and periodic training and guidance to operators in informal food markets by state FSOs effectively reduced food safety incidents and leveraged confidence of consumers. Distribution of surplus food, reduction and reuse of plastic wastes were prominent factors in the success.

- **Gujarat:** Half-day awareness and training programs initiated by state authorities, provision of rapid testing kits, BHOG certification of eating places and canteens in places of worship, schools and institutions Provision of monetary assistance for developing infrastructure for hygiene for street food vendors and team visits by authorities for guidance and inspection further helped in the programme's success.
- **Public-Private partnerships:** Private and Public partnerships for several activities in the Eat Right programme like Clean Street Food Hubs have been executed successfully

in several cities and others are running successfully. For example, in Maharashtra partnership of CII-Industry -State Government for upgradation of 8 states , food analysis laboratories have been initiated. This is expected to significantly improve capability of analysis of food samples in the state thereby ensuring food safety for consumers. Also, commercial partnership in Kerala with Kerala Bakery Association, for upgrade of their processes, advanced technologies for the safer and nutritional bakery items are already in progress.



## ▶ Stories from across the globe

- **Dubai:** The Dubai Municipality has implemented an eat healthy, live healthy program, scheme where restaurants and all eateries are required to apply for licensing. All food operators are supported by the authorities with latest digital technology for helping them benchmark best practices. Basic infrastructure support and facilities for hygienic practices and waste disposal are provided by the authorities to support the food business operators. Restaurants with at least two dishes which meets the criteria of safe and healthy foods and whose guidelines have been provided by the municipal authorities, are eligible to apply for the certification process of Eat Healthy, Live Healthy program. Special licensing for very small food businesses

operators, have also been introduced. Stalls are provided by the authorities to the food operators only when they have been issued a license. The 'Food Code 2020' is a comprehensive guidance document issued by the Food Safety Department of Dubai Municipality which describes the best practices to be followed during preparation of food, storage and precautions. It has been provided for the benefit of food business operators. The guidance document emphasises high risk foods such as eggs, milk, meat, fish/seafood specifically and provide a detailed description of allergens for their labelling norms to be followed by food manufacturing industries on packages.

- **Thailand:** The consumers in Thailand have a strong preference and dependence on food products from informal/fresh markets (wet markets). The public health authorities have implemented guidelines for operators in informal food markets namely, Street Food Good Health Criteria on a 10-point scale which includes health, economic, social and culture with a rating scale of 100 points. Based on due assessments of the operators, Basic, Good and Excellent levels are awarded. Besides the clean food, good taste criteria have a requirement of 12 standards including stall, cooked foods, additives, drinking water, drinks, ice, wash

containers, spoons, fork/chopsticks, garbage and used equipment's to pick up cooked food. Surveys conducted on most vulnerable food types are assessed on the above-mentioned parameters indicating the role of infrastructure facilities and training requirement to these operators/vendors on physical hygiene as well as best practices for food production, handling and storage. Waste collection and management of these areas were important factors where suggested interventions need to be implemented to ensure consistent safety of foods from informal markets.

## ► The Path Ahead

As B20 recommendations to the G20, the following key takeaways were highlighted:

- **Focus on Skilling and Capacity Building:** There is a need for developing an ecosystem of training and certification, third-party audits and hygiene ratings and adopting a cluster approach for implementation of regulations including food safety systems and practices.
- **Unleash the informal sector:** Unpacking the informal economy can potentially contribute for a nation-enhanced food system outcome.
  1. It is recommended that the challenges faced by the informal sector must be strongly emphasized using the best possible mechanism. Towards this, India's Eat Right India Approach emerged as a distinctive model, tested across the country for addressing food safety issues in informal food markets. It is recommended that along with relevant recommendations from the upcoming FAO Document (Guidelines for food safety in Informal Markets), the Indian model should be applicable in middle/ low-income countries.
  2. Forming an association (Committee) of food producers in food informal markets and suppliers of raw materials are encouraged

for local governance. These association/ committees should jointly decide the budget required for mandatory safety practices such as: deep cleaning, storage, pest control, waste disposal and hygienic practices are necessary.

3. To develop a common fund, a small amount of deposit from all vendors/operators in the informal market is necessary. The expenditure must be clearly decided by the members.
  4. Waste collection and disposal from informal markets remain an important concern and must be managed routinely and collectively.
- **Focus on Infrastructure:** Provision of basic facilities, such as infrastructure, water, electricity, cheap transportation and storage facilities, clear, pictorial safety guidelines for operation and accessibility to technology can enhance safety standards in informal markets.
  - **Focus on Guidelines and Regulations:** Specifying limits on production and storage of high-risk food items such as meat/eggs/milk for storage under refrigerated conditions and due hygiene during preparation and discarding of wastes from the immediate environment is necessary.



1. Non-stringent, Pull-push approach must be considered wherever necessary for enforcement of mandatory hygienic guidelines.
- **Focus on PPP:** The ecosystem should include public-private partnerships as it is the need of the hour to leverage knowledge, skills and resources of private partners in taking a national roadmap forward.
1. The public-private partnerships can play an effective role in supporting/financing different aspects required for implementing food safety measures in the informal food markets. These may include capacity building of producers, infrastructure development, affordable provision of clean water/ regular medical examination of food handlers.
- **Focus on Finance:** To ensure sustainable growth of the food informal markets, culture for providing finance to their targeted activities, a small proportion of their total income may be invested with due aid of financial institutions as a common resource for implementing safety/ hygienic measures. The cooperative banks/ public or private financial institutions can be approached for this purpose. The financial institutions must be sensitized duly for this.
  - **Leverage the Industry:** Financial contribution from private companies to associations/ committees with guardianship of state authorities under the CSR scheme to enhance capacity building of informal food market operators, including training, infrastructure and facility development is an essential requirement.







# Preventing Micronutrient Deficiencies: Need for an Accelerated Action

## ► The Need

Micronutrients are vitamins and minerals needed by the body in very small amounts. However, a deficiency of these micronutrients in the body leads to health-related issues ranging from reduction in energy and mental capacity affecting the overall immunity to even some life-threatening conditions. Micronutrient Deficiencies (MNDs) or 'hidden hunger' causes morbidity and mortality, affecting human potential. It is estimated by a study published in the Lancet Global Health, led by the Global Alliance for Improved Nutrition (GAIN) through the USAID Advancing Nutrition project, that over 1 in 2 children under the age of five, and 2 in 3 women between the ages between 15–49 years worldwide are deficient in at least one micronutrient. In many countries in Sub-Saharan Africa and South Asia, 9 in 10 women are deficient, largely due to poor diets, high in starchy staple foods. Even in high-income countries like US and UK, 1 in 3 and 1 in 2 women, respectively are deficient in micronutrients. Iron deficiency alone afflicts over 20 percent of women in both countries. Deficiencies of iodine, iron and Vitamin A are the most common micronutrient deficiencies globally, particularly among pregnant women and children. Deficiencies of iron, folate, vitamin B12 and Vitamin A often lead to anaemia and iodine deficiency can lead to brain damage, stillbirth, spontaneous abortion or congenital anomalies. Similarly, Vitamin A deficiency exposes body to risk of several other infections and is also a leading cause for preventable blindness in children. Low- and middle-income countries bear a disproportionate burden of micronutrient deficiency.

Micronutrient malnutrition is a major impediment to socio-economic development and contributes to a vicious circle of underdevelopment, to the detriment of already underprivileged groups. It has long-ranging effects on health, learning ability and productivity. Micronutrient malnutrition leads to high social and public costs, reduced work capacity among the population due to high rates of illness and disability, and tragic loss of human potential. Overcoming micronutrient

malnutrition is a precondition for ensuring rapid and appropriate development and driver for national growth. Poverty, lack of access to a variety of foods, lack of knowledge of optimal dietary practices and high incidence of infectious diseases are some of the factors which can lead to micronutrient malnutrition. It has been suggested that micronutrient deficiencies can be prevented and even eliminated if optimal quantities of micronutrients are consumed by populations on a regular basis.

The three key strategies identified to address micronutrient deficiencies (MNDs) are: (a) dietary diversification and improvement; (b) micronutrient supplementation, and (c) food fortification. However, concerted, holistic efforts are needed to understand, mobilize action and resources to bring about tangible impact.

India is uniquely placed to play a critical role in exemplifying the merits of such a food systems transformation resulting from a more cohesive multi-sectoral effort comprising of the government, non-government and private sector. Having a healthy population free of all forms of hunger and having a food production system that produces nutritious food packed with micronutrients has a bearing on possibly on most of the UN 2030 SDGs. Sustainable and healthy diets for all can help to end hunger and malnourishment in all its forms (SDG2), reduce health burdens (SDG 3) and remain positively linked to quality education, thus enhancing overall human potential (SDG 4). A well-nourished population grows, learns and participates effectively as a community and is more resilient to crises.

By being profitable for the actors engaged therein, robust food systems can facilitate the elimination of poverty (SDG1), advance economic growth (SDG 8), and have a positive bearing on reducing conflicts (SDG 16). Resilient food systems will provide equal opportunities for all, thus ensuring improved gender balance (SDG 5) and reduced inequalities (SDG 10) owing to fairer trade and

more gender-sensitive approaches. Sustainable land and water management practices will result in improved water quality (SDG6), improved conditions of land restoration and biodiversity (SDG 15 and 13) along with cleaner energy sources (SDG 7) that are less detrimental to aquatic and marine lives (SDG 4). Transformed food systems will also lead to overall lower ecological footprints, beneficial environmental impacts and lower food loss and waste (SDG 12).

Greater focus is needed on making nutritious food, with high micronutrient content, available, affordable, and desirable for all. A similar focus is needed on intensifying dietary diversity, coupled with fortification and supplementation to prevent and correct micronutrient deficiencies. While 'large-scale food fortification' and 'biofortification' are not 'silver bullets' for addressing micronutrient deficiencies, they are critical for strengthening food systems.

Overall, an efficient and complete food system is essential to deliver all basic nutritional requirements and in alignment with the SDGs, micronutrient deficiency mitigation strategies

become a driving force behind food systems transformation and vice versa.

This session deliberated on the key strategies and proven interventions that hold promise to mitigate micronutrient deficiencies at the population level. Also, it brought together key partners from the government, research agencies/ think tanks, and the private sector to discuss key takeaways and evidence-based strategies, with specific focus on low-and-middle income countries.



## ► The Stories

Globally, micronutrient deficiency alleviation activities have included interventions like Food fortification, Dietary diversification and supplementation. All these need to be closely monitored using an accountability metrics such as developed by Access to Nutrition Initiative in order to ramp up the impact. The ATNI accountability metrics not only focuses on product indicators for company's product profile but also measures their engagement and commitment towards micronutrient deficiency prevention through their policies.

Below are some global best practices, implementation models and case studies for effecting food systems transformation:

### **Extending Technical Assistance for implementation: Implementation Model of GAIN for Large Scale Food Fortification to Address Micronutrient Deficiencies**

Global Alliance for Improved Nutrition (GAIN) is providing technical assistance to multi-sectoral partners for enabling food fortification and biofortification at global, regional and country levels.

Food-based approaches engaged by GAIN, like the improvement of the micronutrient content of widely consumed foods through industrial or large scale food fortification (LSFF) or biofortification, of staples like wheat and maize flour, rice, milk, edible oil, and condiments like salt, are proven to be efficacious, cost-effective, and scalable solutions for improving micronutrient intake of people, leading to improved associated health outcomes.

Since 2002, GAIN has supported roll-out and strengthening of fortification in nearly 40 low and middle-income countries. Resultantly, 15 countries have mandated LSFF. GAIN has contributed to mandatory legislation in many more countries. Nearly one billion people have sustained access to fortified foods in current GAIN-supported programmes, including the GAIN Premix Facility. Premix is the micronutrients added to the fortified food vehicle like wheat or milk. In lower-income countries, these fortificants are not produced domestically and instead imported, rendering it very expensive and its quality questionable. GAIN's Premix Facility, operational since 2019, has established a mechanism for competitively





procuring vitamin and mineral premix from suppliers with proven quality systems and processes.

The list of quality-assured suppliers (Across 18 countries) under various categories i.e., premixed blends, Vitamin A, and micronutrient powders, which are sachets for home fortification, potassium iodine etc. is available in the public domain. Any food producer can access the list of quality assured suppliers and buy directly, and GAIN's approval is also recognized by UN agencies. GAIN operates this procurement platform that works with a quality-assured list of suppliers, which encourages competitive bidding between suppliers, hence ensuring the best quality.

GAIN with partners, also works to commercialize nutrient-enriched, biofortified crops, to expand the use of conventional crop breeding methods, and produce crop varieties that are denser in bio - available vitamins and minerals, while having better productivity, resistance to biotic and abiotic stresses, climate resilience etc. Biofortification has now been included in national nutrition policies and agricultural policies in Africa ( Malawi, Nigeria, Tanzania, and Uganda) and Asia (Bangladesh and Pakistan) etc.

### **Raising accountability of business and transparency: ATNI Global Index for Food Companies**

The ATNI Global Index ranks 25 of the world's largest food and beverage manufacturers on their nutrition-related commitments, performance and disclosure. It ranks companies (From zero to 10) on seven categories: governance, products, accessibility, marketing, lifestyles, labeling, and engagement. It also assesses 'healthiness of companies' product portfolios' using the Health Star Rating model, which measures nutrition content of food products.

ATNI's India Spotlight Index (2020) found that companies are showing a greater understanding of, and commitment to fighting the double burden of malnutrition in India. 16 of the largest food and beverage manufacturers (i.e., nearly 1/3rd of the food and beverage market) take action to fortify products or commit to reformulate products in line with government initiatives to address India's nutrition challenges. Ten of the 13 companies, for which staple food fortification is relevant, voluntarily fortify some or all products as per standards set by FSSAI. However, more innovative, healthy and affordable products can and should be introduced for intensifying change.

This has led to more companies taking action to commit to reformulating products based on government initiatives. In recent years, India has recorded a rise in retail value sales for fortified foods by 9 percent in 2021 and a rise in retail sales by 10 percent. It also notes a rising disposable income and health consciousness among Indian consumers that augurs well for intensifying fortification efforts.

### **Retail Regulation: The Implementation Model of Fortified Salt in Kyrgyzstan:**

Retail regulation support can be an effective approach to drive compliance especially where consumer awareness is high, there is a slow manufacturing compliance and government monitoring systems are lacking.

A case in point is the 2006 USAID-Swiss Red Cross project implemented by UNICEF in Kyrgyzstan, targeting Sustainable Elimination of Iodine Deficiency in the Kyrgyz Republic, with a focus on Universal Salt Iodization. It engaged with the private retail sector to improve fortified salt from 60 percent in the baseline to 80 percent in a span of 2 years.

Key activities under the project focused on strengthening external and internal monitoring and reinforcement mechanisms, raising consumer awareness and building capacity of those involved in social mobilization and dissemination of information. Special attention was paid to the sustainability of salt iodization and national ownership. This was done by giving retailers rapid test kits and training them on how to use it; and the retailers in turn educated consumers on the benefits of consuming iodized salt. The intervention was one of the most successful ones ever and is evidence to how private sector large manufacturers and retailers can complement fortification programmes.

### **Campaign Mode for Micronutrient Supplementation to Tackle Emerging MNDs**

The Intensified Diarrhoea Control Fortnight (IDCF) programme of the Government of India (IDCF) is implemented in campaign mode, annually, since 2014 across all Indian states & UTs to prevent and control deaths due to dehydration from diarrhea in children. It aims at 'bringing the number of deaths due to diarrhea in childhood to zero' and is organized in summer/monsoon to enable preventive measures. A multi-sectoral participation approach at various governance levels for better impact is used here, including mass awareness generation, rallies, competitions



in schools, state and district-level launch by community leaders etc. to achieve the target.

The Government of India has also launched a bi-annual supplementation programme for vitamin A for over four decades. This is also operational in over 70 countries and is recognized as one of the most effective public health interventions ever undertaken.

There is a need to amplify the reach of interventions for addressing micronutrient deficiencies such as the deficiency of Vitamin D, Zinc deficiency and iron deficiency using campaign-mode as a Public Health Programmes to meet greater success. In India, Zinc deficiency is prevalent in one out of three adolescent boys (CNNS 2016-18 study). Vitamin D deficiency was found among 14 percent of pre-school children, 18 percent of school-age children and 24 percent of adolescents. Nearly one-fifth of pre-school children (19 percent), 17 percent of school-age children and 32 percent of adolescents had zinc deficiency leading to poor immune systems, among other micronutrient deficiencies.

### **End-to-end Traceability of Supply Chains**

There is a need to develop traceability solutions to digitize, secure and leverage valuable data, enabling safer, more sustainable, more efficient and transparent supply chains in public health interventions. This can ensure end-to-end traceability at supply and demand points and the efficiency of overall public health programs catering to tackling micronutrient deficiencies by ensuring product safety, better operational intelligence, mitigating systemic leakages if any, increasing consumer trust and engagement, and reaching sustainability goals.

A case in point are corrective actions being explored in the public health supply chain for iron and folic acid supplementation in India under Anaemia Mukt Bharat strategy to enhance its reach for tackling anaemia.

Another case in point is GAIN's Digital Quality Assurance and Quality Control Systems (QAQC) programme for its food fortification projects in Bangladesh, Nigeria and India which aims to develop country-owned, digital, user-friendly systems that enable mills and government authorities to generate, govern, share, and utilize real-time, accurate, secure, and traceable data on food fortification quality from factories to markets.

### **Effective communication on Visual Communication Modes:**

For effective public health communication on tackling micronutrient deficiencies, there is a need to focus on the need to build capacities of the front line functionaries, ensure demonstrations in-field, linking 'food conversations' in the community to Public Health Programmes for tackling micronutrient deficiency, and repetitive messaging using visual tools, for example the visual of the "food plate" developed by ICMR-National Institute of Nutrition (Ministry of Health and Family Welfare, Government of India) for promoting healthier diets and nutritional literacy even at the household level.

### **Supportive Government and Policy Environment for Fortification**

Fortification in India has found much acceptance with governments providing a more conducive regulatory environment, which helped enhance market demand of fortified foods being recognized and aspired for, with the "+F logo" applied on fortified foods, establishing the Food Fortification Resource Center etc. The impending universalization of rice fortification are some of the other case studies of interest that are attempting to ensure healthier diets with assured quality.

### **Partnerships, Collaborations & Networks**

Fortification needs a multisectoral partnership set-up to be working more closely. For instance, the issue of long-term quality and traceability – wherein a system runs even with no partners support – is being looked at by multiple organizations and collectives. Organizations like PATH and GAIN are working on digital solutions, to mobilize action through networks like "Poshtik".

### **Role of Business in Fortification: Case of Tata Salt in India**

In India, an exemplary case of public-private partnership ushering benefits of fortification has been, the successful fortification program of universal iodization of salt with fortification in this case being mandated by the government now.

A case in point is of Tata Chemicals (now Tata Consumer), the first-ever business that launched iodized salt in 1983 using the NIN-formula, as a first micronutrient-enabled product. Tata Consumer's portfolio includes staples, commodities, millets, liquid business, brands which presents many opportunities to address consumer needs across segments and target categories. Their work in innovations and health awareness remains focused on developing double-fortified products,





'Tata Salt Plus' for instance, to tackle anaemia. The importance of public-private partnerships (especially FSSAI) here is the key especially for the public sector to support in ensuring consumer acceptance of fortified products. For example, with FSSAI guidance, a new formula has been approved for double-fortified salt (Meets 50 percent RDA of iron) and is being tested in the market.

Affordability and the deep reach of a vehicle like salt are crucial to this initiative. Fortification with Vitamin D, Zinc and Calcium are other recent fortificants in salt being explored by Tata Consumer. Millets are also a new vehicle being explored for micronutrient enhancement.

### **Smarter Crops for Future Shocks: A Case of Biofortification by Harvest Plus**

Harvest Plus has for over 20 years worked on the development, commercialization and dissemination of bio-fortified varieties – with 400+ varieties, in over 40 countries, reaching 17 million farmers and 89 million consumers globally. These are higher in nutrient-content, are climate-smart and cost-effective (every 1 USD spent on bio-fortification yields 17 USD in benefits), and relevant for vulnerable segments like poor farmers, who eat what they grow. Biofortification is especially effective when food is grown close to the point of consumption. With 2023 celebrated globally as 'International Year of the Millets' and India being the largest producer and consumer of millets, has drawn focus on enhancing their nutrient content through bio-fortification of all major millets like Iron-rich pearl millet, Calcium-rich finger millet, Iron and Zinc-rich sorghum. This is especially advantageous with most millets being cultivated in areas with high burdens of micronutrient deficiencies. For example, with tribal populations or mountainous regions, which are then a good fit, given the tough climatic conditions and the related climate smart nature of such crops.

### **All-pervasive strategy to defeat micronutrient deficiency**

The Lancet Global Health indicates that 1 in 2 preschool-aged children and 2 in 3 women of reproductive age worldwide are affected by vitamin and mineral deficiencies or "hidden hunger". Beyond affordability and access, the situation is also affected by food choices and food culture and traditions. Dietary diversity and fortification and supplementation need to go hand-in-hand to ensure a all pervasive attack on the scourge of hidden hunger. A case in point are 126 countries globally that have fortified salt and 75 percent of all countries mandate fortification of

atleast one food. More countries like India needs to enter the fray of fortification. There is a need to enhance qualitative monitoring and compliance of fortification. We need better data on coverage and consumption patterns at national and sub-national levels to better inform multi-sectoral, and collaborative fortification efforts.

### **Milk Fortification- the Indian story**

Micronutrient malnutrition is a silent epidemic contributing to higher levels of stunting, wasting and underweight issues among children in India. The issue is particularly pervasive in children, leading to impacted growth, affecting their physical and mental wellbeing. Among children under the age of five years in the country, more than 70 percent are deficient in Vitamin D, and 57 percent lacks adequate levels of Vitamin A. The Milk Fortification Project aimed at fortifying milk with Vitamin A and D, and for consumer promotion and scale-up. Fortification is a simple, powerful, and cost-effective nutrition intervention with the potential to address micronutrient deficiencies on a large scale. Since milk is a natural source of many vitamins, it is most appropriate for fortification given that it is a staple food in India consumed by people from all age groups. Intensive capability development, awareness and coordination with relevant stakeholders proved to be successful. The efforts have led to aligning the supply and demand for fortified milk in the market. It has been ensured that the dairy cooperatives are equipped to produce fortified milk, and is reaching consumers at affordable prices. Significant progress has been made in terms of open market availability of fortified milk across the country. At present, around 30 cooperative brands are fortifying milk and reaching consumers across 23 states of India.

### **The case of Rice Fortification**

Rice fortification is a process of adding micronutrients like iron, folic acid and vitamin B12 is an effective, preventive and cost-efficient complementary strategy to address the nutrition problem within a short period. Though India made reasonable progress in controlling stunting and anaemia among children and women over the last decade, anaemia still impacts more than one in two children and women. The WHO has declared anaemia among women and children as a "severe" public health problem, demanding immediate attention. Further, recent statistics indicate rise in anaemia levels amongst women and children in 16 and 18 of 22 States/UTs respectively (NFHS-5). Iron deficiency-anaemia is the biggest cause of disability for the past 10 years and contributed 20 per cent direct and 50 per cent associated maternal deaths in India. Its economic burden is equivalent to about 4 per cent of GDP.



Apart from iron, deficiency in micronutrients like vitamin B12, vitamin A, folate and zinc also contribute to rising anaemia levels. Rice fortification, a process of adding micronutrients like iron, folic acid and vitamin B12, is an effective, preventive and cost-efficient complementary strategy to address this problem within a short period. Rice fortification project has been initiated

with the above aim and several pilots to scale approaches have been carried out. It has been emphasized that including fortified rice in social assistance programmes represents an enormous opportunity to improve nutrition in India, where micronutrient deficiencies are widespread, and programmes reach millions of people.



## ▶ The Path Ahead

As B20 recommendations to the G20, the following key takeaways were highlighted:

- **Intensifying Corporate Commitments for Better Nutrition and Fortification:** Intensifying institutionalization for fortification requires the commitment of private sector players. Top 25-30 percent companies (representing processed global food and drink sales) in G20 countries, represent a powerful group that could exert positive influence on procurement and supply chains of healthier products. According to ATNI data, about 70 percent processed foods on shelves globally are unhealthy. To accelerate private sector action for better nutrition and to ensure that 50 percent of packaged food products contribute to sustainable and affordable healthy diets by 2030, ATNI supports the ATNI's Investors in

Nutrition and Health (AINH) in their corporate engagement activities with global food and beverage manufacturers.

- **Inclusion of Nutrition Metrics in Private Sector ESG regulations:** To promote adoption of nutrition metrics, like providing nutritious food to workforce at factories/offices across top-listed firms and ensuring quality of packaged food and beverages, there is a need to intensify endeavors for nutrition metrics being embedded in ESG regulations in G20 countries. For example, in India, SEBI requires top 1,000 listed companies to mandatorily disclose Business Responsibility and Sustainability Reporting from FY2023. ATNI plans to engage with stakeholders to incorporate workforce nutrition metrics as part of SEBI's new ESG requirements.





- **Increasing Capacity Building and Awareness:** A sound academic program in nutrition must be a part of curricula in schools to enable adequate knowledge during formative years. PPPs are crucial in building action for healthier foods by ensuring shareholders and investors demand better nutrition as part of their ESG investment strategies, across G20 countries. Despite a perception that food and nutrition are 'government-centric issues', collaborative campaigns for fortified products can promote their production and consumption. Campaigns such as FSSAI's Eat Right melas, Walkathons, and Swacch Bharat Yatra encourage the use of fortified products, but the momentum has to continue.
- **Intensifying Commitments from Institutional Investors:** As providers of capital to food and beverage corporations, institutional investors can promote better corporate performance on issues like improving health and nutrition. This is important for investors in G20 as emerging markets and developing economies will account for 80 percent of global growth this year and next; with India expected to contribute 15 percent. Corporate commitment for healthier foods, is key to investment strategy, for investors using shareholder power to influence positive corporate behaviour.
- **Increase Alignment of Private Sector Objectives with Country's Nutritional Goals:** Private sector objectives should be better aligned with health and nutrition

goals of the government. The goals of private sector and the government should offer complementarity to large-scale food fortification, biofortification, micronutrient supplementation, dietary diversity, nutrition-intensive farming, to alleviate malnutrition challenges in G20 countries.

- **Leveraging Private sector Technological Advances and Innovations:** Private sector corporations can play a major role in enabling access to technological innovations, in the multi-faceted approach to overcoming micronutrient malnutrition. Production of biofortified seeds and farming technologies across G20 countries may be better used as 'public goods', available for all, where inter-country and intra-country leveraging of such innovations can enhance common knowledge and resource base.
- **Availability of Fortified Food for People:** Policies and programmes must be developed to ensure availability of and access to an adequate variety and quantity of safe, foods replete with micronutrients for people. Efforts to reduce the current costs of fortified foods should be attempted after due endorsement from the government by manufacturers. Ensuring access to and affordability of healthy and diverse diets would be the key to a sustainable long-term strategy for micronutrient sufficiency.





# Transforming Food Production Systems through Agro-ecological Practices

## ► The Need

Unsustainable food production systems are one of the primary drivers for Earth's system to exceed planetary boundaries. While intensive agricultural practices such as those promoted under the Green Revolution played a crucial role in increasing agricultural productivity and enabling food security for billions of people, they came with increasingly visible environmental and social impacts. Over-emphasis on meeting food and fibre requirements through intensive chemical inputs (fertiliser, pesticides etc.) and monocrop-based production led to degradation of the land and natural resources essential for our ecology and sustenance. If the current production patterns continue, about half of the world's water demand will be unmet by 2030. When it comes to soil, it is estimated that up to 40 percent of the planet's land is degraded which is detrimental to global food and nutrition security and negatively impacts climate, water systems and biodiversity. In India, close to 30 percent of soils are depleted with less than 0.05 percent carbon.

Globally, there is a growing acknowledgment of the significance of agroecology as a crucial pathway for food systems transformation. In 2019, the High-Level Panel of Experts (HLPE) representing the science-policy interface of the UN Committee on World Food Security (CFS), defined agroecology as an approach for food systems transformation guided by 13 interconnected principles, which are in line with the 10 elements of agroecology propounded by FAO. This transdisciplinary approach includes the ecological, economic, socio-cultural, technological, and political dimensions of food systems. Its principles aim to optimise the interactions between humans, plants, animals and the environment ranging from field and landscape to the societal level with focus on producer-consumer connectivity. This approach can potentially reconcile productivity and sustainability by enhancing biodiversity, reversing land degradation, restoring ecosystem services

and ultimately strengthening the food production system. With Indian governments at national and state levels actively encouraging agroecological approaches, such as natural farming, the lessons drawn from these can contribute to a better global understanding.

India's transition from a state of relying heavily on imported food (ship to mouth) in the era of the Green Revolution has brought about a significant shift from traditional to modern agriculture practices. Presently, India boasts a foodgrain surplus of nearly 2.7 times the buffer stock norms (21 million tonnes). Nonetheless, less than 1-2 percent of agricultural activities are conducted using organic or natural methods. With India assuming the G20 presidency, there is no better moment to critically examine and reassess existing food system practices and chart a path forward. To make this a reality, multiple stakeholders from the public and private sector, civil society, academia, and the parliaments need to work together at various levels, enabling agroecological uptake at the local level, supported by the policies and resources at national and global level. Given the global and collaborative scale of food systems transformation, the G20 can enable global leadership to strengthen global governance focussing on integrated approaches such as agroecology.

The session on "Transforming food production systems through agroecological practices" aimed at initiating dialogues with the sector representatives who rely heavily on the production ecosystems to understand the challenges associated with the existing production system and explore the possibilities of adopting agroecological approaches. The session also deliberated to develop a road map for integrating agroecology into business strategy and operations, particularly for agri-based industries.



## ► The Stories

- A growing momentum for agroecological production systems:** In Andhra Pradesh, approximately 700,000 farmers and their households have already embraced natural farming practices. Similarly, in Himachal Pradesh, around 120,000 families are actively involved in some form of natural farming. Sikkim in as early as 2005, declared itself a fully organic state. Furthermore, Madhya Pradesh has 100,000 certified organic farmers who are actively seeking market opportunities. States like Uttar Pradesh, Uttarakhand, Gujarat, and numerous others have also made significant progress in this area. These remarkable social movements showcase the farmers' profound acceptance and adoption of this sustainable form of agriculture, supported by their governments and civil society organisations.
- Government of India actively promotes natural farming, garnering attention and discussion at the highest levels, from the Prime Minister's Office (PMO) to various state governments. The Ministry of Agriculture has established the National Mission on Natural Farming (NMNF) as an independent and dedicated program starting from 2023-24. This initiative expands upon the *Bhartiya Prakritik Krishi Paddati* (BPKP) and is designed to provide comprehensive assistance to each state in a well-planned manner, allocating additional resources and time to encourage the adoption of chemical-free farming practices and to expand the reach of natural farming. The National Bank for Agriculture and Rural Development (NABARD) has launched an agroecology-based programme 'JIVA' that promotes natural farming under its existing watershed and wadi programmes in 11 states through 24 pilot projects. The implementation of the 'International Year of Millets' by India and many countries showcases a focussed approach to build up farm-to-fork approaches for climate- resilient super-foods.
- An emerging Global Partnerships model:** The 'Indo-German Lighthouse on Agroecology and Sustainable Management of Natural Resources' is a high-level partnership between India and Germany with the aim to support transformation towards sustainable agriculture and food systems, taking a holistic and integrated view with a focus on rural and regional development encompassing all dimensions of sustainable development and all levels of action.
- Research and evidence creation:** For an evidence-based policy formulation process that drives transformative programmes for this evolving agenda of agroecology, India and Germany have established an 'Indo-German Academy for Agroecological Research and Learning' for joint research, training and the development of cutting-edge knowledge through 'farmer-scientists' as well as research institutions and practitioners from India, Germany, and other countries. German Development Cooperation is working closely with NITI Aayog to establish research and learning relationships between Indian and German Research Institutions on agroecology. The CGIAR 'One Agroecology' project and the initiatives by Indian Agricultural Universities and Krishi Vikas Kendras have established research and demonstration farms on natural farming all over India and other key ecosystem support processes.
- Strengthening agroecology transformational networks:** The National Coalition for Natural Farming is a collaborative platform for accelerating the spread of agroecology-based farming practices in its multiple variants, improving on existing practice and collaborating for enhanced policy discourse. The Revitalizing Rainfed Agriculture Network is a network of civil society organisations, researchers, practitioners, and policymakers with the vision to establish productive and resilient rainfed agriculture. AVT McCormick is an industry leader in sustainable spices, and through a development partnership supported by BMZ, A.V.T. McCormick and GIZ are working to advance regenerative agriculture in the spice sector. They follow a three-pronged approach: Farmers working with them, brands that rely on them and traceability and regulatory information from across the globe.
- Innovative technology-based solutions:** AgriTech startups are playing a vital role as innovative solution providers in the agricultural sector. For instance, Cropin's DEWS (Disease Early Warning System) model is an advanced technology that utilizes weather data for disease prediction, providing farmers with an early warning up to 15 days in advance. This not only reduces costs by avoiding unnecessary spraying, but also helps prevent crop losses.

- Rice, the world's third largest cultivated crop, is known for its high resource intensity, requiring 3000–5000 litres of water per kilogram. However, this water usage can be reduced through the implementation of proven concepts and technologies. By shifting production methods from the traditional transplanted rice system to alternatives such as DSR (Direct Seeded Rice), AWD (alternate wet-drying) methods, and PMDS (Pre-Monsoon Direct Sowing), significant water savings can be achieved. Notably, leading technology-based rice companies like Savannah Seeds are actively involved in the development of smart rice varieties with high yields and value-added traits. Collaborating with rice farmers in Punjab, Haryana, Chhattisgarh, and Uttar Pradesh, Savannah Seeds focuses on promoting direct seeded rice systems. They have successfully introduced a non-GMO, herbicide-tolerant rice variety through mutation breeding. This particular rice variety effectively controls weeds when used for direct seeding. Despite yielding similar results to the transplanted system, this method conserves approximately 30 percent of water and reduces labour costs associated with transplanting.
- **Enhanced consumer awareness and uptake:** While sustainable production is very important, a regular and dependable demand for agroecologically produced foods is essential to strengthen and sustain the value

chains. For the consumers to demand healthy foods that are also good for the environment, engagement on consumer awareness and trust has to be increased manifolds. One example is the Responsible Sourcing for Palm Oil (RSPO) by WWF, which has been one of the fastest growing certifications and takes care of the origin of the commodity, showcasing a testable system that ensures commodities are not coming from deforested areas. Many companies already endorse it, and their supply chain is very much compliant with the RSPO certification. WWF and many agencies are working with a coalition of global partners to promote the sustainable production and use of cotton in a variety of ways. About 30 percent of the cotton in India is fully compliant with better cotton initiative.

- **Proven models:** Under the Umbrella Program for Natural Resource Management (UPNRM) by NABARD, supported by GIZ and KfW on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), almost 700 crores INR worth of loans for integrated farming practices were given out. Some of the most vulnerable pockets of India, farmer groups, foundations, NGOs etc. were the beneficiaries who showcased a blended-financing model for large-scale promotion of agroecological approaches by financial institutions and banks.
- The Participatory Small-scale Irrigation Development Programme was implemented in Ethiopia. Under the programme, poor rural households benefit by reducing the impact of climate change, enhance economic growth and reduce rural poverty. The program was a success in its first phase including improvements in the living conditions of smallholder farmers. Best practices are being further scaled up during the second phase.
- The approach and success of the Odisha Millets Mission showcases how sustainable food production, procurement and mid-day meal-based school feeding programme offers an impactful pathway for the population, scale nutrition and food systems intervention.



## ▶ The Path Ahead

**As B20 recommendations to the G20, the following key takeaways were highlighted:**

**Promote a business-oriented approach to agriculture, which empower farmers as entrepreneurs, and foster sustainable practices throughout the value chain.**

**The G20 can:**

- Increase both public and private investments in developing sustainable value chains and adopting a circular economy approach.
- Facilitate better access to capital for smallholder farmers and Micro, Small and Medium Enterprises (MSMEs) by creating more affordable and tailored financial solutions that unlock credit and help manage risks (climate, disease-pest and markets).
- Enhance the productivity and capabilities of smallholder farmers, rural agri-food sectors, MSMEs, and entrepreneurs through research, training, and knowledge sharing on strategies to increase yields, improve logistics, and enhance market efficiency.
- Invest in food innovations that promote access to sustainable food for the poor and vulnerable populations. However, private sector investments should be accompanied by responsible governance. The public sector should play a crucial role in improving incentives and reducing transaction costs for private sector involvement.
- Encourage industries to qualify for carbon credits, and share it with farmers, as farmers would be more willing to adopt sustainable practices if they are incentivised with additional income.

**Promote the judicious use of natural resources and the responsible application of chemicals as a crucial step towards agroecological transformation.**

**The G20 can:**

- Lead a global phase-out of chemicals that are proven harmful to human health. Implement policies and regulations to identify and gradually eliminate the use of such chemicals in agricultural practices.

- Encourage research and development of safer alternatives to harmful chemicals, fostering innovation in the agricultural sector and promoting the adoption of sustainable and non-toxic practices.
- Encourage the adoption of sustainable production practices aimed at producing more nutritious food while reducing water consumption and greenhouse gas emissions. This requires education and raising awareness among farmers about the benefits and techniques of sustainable farming.
- Implement mechanisms to remunerate farmers who transition to agroecological production and utilise inputs judiciously. Recognise and reward their efforts in promoting environmentally friendly practices that contribute to the preservation of natural resources and the reduction of chemical inputs.

**Promote discussions on consumer education, awareness, and innovative solutions for sustainable consumption, including addressing food waste:**

**The G20 can:**

- Recognise the pivotal role of consumers in driving food systems transformation. Prioritise consumer education to enable informed choices that benefit both individuals and the planet.
- Foster collaborations between private and public partners to conduct education and sensitisation campaigns, utilising publicity, advertisements, and other channels to raise awareness about sustainable choices.



- Encourage collaboration between the public and private sectors to develop innovative solutions for sustainable consumption and reduce food waste.

**Establish a policy framework and conducive ecosystem to facilitate the adoption of innovative practices and technologies:**

**The G20 can:**

- Promote the use of new technologies that can share real-time information, minimise post-harvest losses, and support climate-resilient and disaster-informed agricultural systems.
- Encourage governments, policymakers, and public-private partnerships to actively participate in the digitisation of agriculture. Utilise satellite imagery and data science to generate valuable insights, enabling predictions related to crop and soil health for improved regenerative practices.
- Develop a robust and credible public technology infrastructure (“Agristack”) for traceability in ethical farming and sourcing, ensuring transparency and enabling consumers to make informed choices.

- Recognise the value of Open Data as a public social good, enabling broader access and utilisation for the benefit of farmers, researchers, policymakers, and the public. Leverage the potential of Open Data and Artificial Intelligence for fostering innovation, research, and knowledge sharing in the agricultural sector.

**Foster a broader coalition for food systems transformation, engaging consumers and farmers in a transparent manner:**

**The G20 can:**

- Encourage the formation of a larger coalition that includes consumers and farmers, to actively participate in shaping the demand-supply side connects and articulating their present and future interests.
- Facilitate transparent dialogue and negotiation among all stakeholders within the coalitions, and between coalitions - ranging from local, state, national, multi-country and global levels, ensuring their perspectives are heard and taken into account when designing and implementing transformative strategies for food systems.







# Reducing Post Harvest Losses: Greening the Cold Chains

## ► The Need

At present, about 30 percent of the food produced globally, is lost or wasted. As per FAO and UN reports, food loss and waste accounts for 8 percent of global greenhouse gas emissions. These emissions are expected to reach 685 PPM CO<sub>2</sub>-equivalent by 2050 (OECD). This creates a need for sustainable and climate-friendly innovations that can help prevent post-harvest losses and contribute an efficient agri supply chain. We need to think geographically while having innovations for global problems and reorientate them towards resolving global challenges.

GHG emissions from food loss are also significant contributors to India's GHG emissions. To meet our target of reaching net-zero by 2070, the Indian Government has made considerable progress in its efforts towards decoupling economic growth from GHG emissions. Investments in cold chain can significantly contribute towards food loss and efforts are made globally and in India towards decarbonization in the post-harvest supply chain.

Although the World Bank estimates that around USD 56 billion is spent every year on agricultural research, investment in post-harvest innovation is not expanding at the rate that is needed to address climate change and prevent pre- and post-harvest losses. Taking this further the pillar of Global Action Agenda for Innovation in Agriculture, launched in COP26, aims to close the 'innovation gap' in agriculture and food system.

On similar lines, Cool Coalition has come together rapidly to ensure that transition to efficient, climate-friendly cooling for all is fundamental for climate action and sustainable development in association with UNEP.

Going forward, an approach is needed to redefine the cold-chain architecture and map the opportunities available to reach net-zero emissions by 2070 as well as identify the roles for innovative and sustainable cooling technologies. A study by the International Institute of Refrigeration (IIR) shows, for example, that, at global level, an improved global cold chain would allow for a reduction of almost 50 percent of the CO<sub>2</sub> emissions of the current cold chain. Similarly, such

an improved cold chain would avoid 55 percent of the food losses attributable to a lack of cold chain and thus significantly contribute to food security. (Source: the carbon footprint of the cold chain, IIR)

The changing climate ecosystem is poised to create economical, business, and social risk in the future. It is more critical to be cognizant of the fact that it will impact the food basket of any country disrupting food production, and thus food availability.

Climate change is a direct consequence of carbon-heavy land-use, agriculture, transport, buildings, industrial processes and polluting energy sources. Without necessary interventions in these sectors, it will be difficult to protect the environment from the effects of higher temperature.

Carbon emission is one of the most critical problems the world is facing today, and it is bound to have detrimental impact on business as well as people in society. To swiftly avert the impact of these emissions is to transform the manner of consuming and producing energy into the system.

Further, the Kigali Amendment to the Montreal Protocol, which has already been ratified by 149 nations to date, requires a phasedown of high global warming potential refrigerants and it is estimated that such action can avoid to 0.5°C of global warming by the end of this century.

Replacing hydrofluorocarbons (HFCs) with greener refrigerants creates results in increase energy efficiency and thus to reduce energy costs for users.

As per the reports, there is a need for 45 percent reduction in the global net human-caused emissions of carbon dioxide (CO<sub>2</sub>) by 2030 to reach a net zero by 2070. Global warming is proportional to cumulative CO<sub>2</sub> emissions, which means that the planet will keep heating for as long as global emissions remain more than zero. This implies that climate damage, caused by global heating, will continue escalating for as long as emissions continue.



## ► The Stories

### Collaboration towards transformative solutions

The Africa Centre of Excellence for Sustainable Cooling and Cold-Chain (ACES) was established in 2020 by the Governments of the United Kingdom and Rwanda, the Centre for Sustainable Cooling, United Nations Environment Programme's United for Efficiency initiative and the University of Rwanda.

The Centre has been established to develop and accelerate uptake of sustainable cold chain solutions in the agriculture and health sectors throughout Africa. In doing so, ACES will economically empower farmers, increase export revenues, enhance job creation in rural areas, mitigate climate and environment impacts, and foster low-carbon development.

ACES will deliver against key global goals including UN SDGs, Paris Climate Agreement and Kigali Amendment to the Montreal Protocol and country's own policy objectives such as Rwanda's Vision 2050 or Africa's Agenda 2063.

Using a "hub and spoke" model, the ACES campus in Kigali, Rwanda and a network of Specialised Outreach and Knowledge Establishments

(SPOKES) will develop and disseminate expertise to accelerate sustainable and resilient cooling and cold-chain solutions across Africa.

ACES campus will serve as a "hub" where collaborative research will be undertaken, new equipment will be tested, knowledge building, capacity building and training programmes will be undertaken. SPOKES will be deployed in strategic locations across Africa to demonstrate solutions, provide technical assistance and cascade knowledge to the local markets. The first of these is in Kenya with funding for further SPOKES secured and market intelligence being developed on potential markets.

### Cooling as a Service

Cooling as a Service (CaaS) is an innovative business model that enables customers to base their decision on life-cycle cost rather than on the purchase price of cooling equipment. The model aims to enable clients to benefit from high end and energy efficient cooling technologies without the need of an upfront investment. CaaS involves end customers paying for the cooling they receive, rather than the physical product or infrastructure that delivers the cooling. The technology provider installs and maintains the cooling equipment, recovering the costs through periodic payments

made by the customer. These payments are fixed-cost-per-unit for the cooling service delivered (for example, dollars per tones of refrigeration, or units of cooled air), and are based on actual usage. The technology provider also pays for the electricity consumed by the equipment, which is an incentive to install the most energy-efficient equipment, and to perform high-quality maintenance.

The technology provider can be recapitalised through innovative mechanisms such as sales and leaseback, project finance or the securitisation

of cash flows. A payment guarantee can be established to reduce the risk of default from the end-client, which can be endorsed so that banks reduce their exposure to payment default by technology providers seeking the use of the above-mentioned financing mechanisms.

Thus, Cooling as a Service accelerates deployment of clean cooling technology at scale in emerging markets, by lowering upfront equipment costs and aligning incentives for the most efficient operations and maintenance.



## ▶ The Path Ahead

As B20 recommendations to the G20, the following key takeaways were highlighted:

**Affordable and actionable technologies in cold chains can play transformative roles in reducing food losses.**

- Recently developed virtually operable models can help understand the impact of implementation of technological interventions. These models upon thorough validation can enable globally connected resilient food chain(s) to address the international goals as well as be beneficial to low-income countries. Besides this, these models can play an important role in addressing the SDG goals. Benefits of this model also include reduced

food loss, improved nutrition and reduced mortality.

- For 2030 ESG goals, sustainable life cycle solutions including farm-to-fork, aggressive reduction of energies, decarbonization and electrifying cold chain transport, vector hydrogen and digital connectivity are crucial. Besides a strong advocacy and partnership throughout is also important.
- Increasing energy efficiency, energy recovery and sourcing renewable energy is key for advancements in this sector. Lack of consistent data on food losses is important for adopting the right decision. India can be a game changer by reducing energy losses through

intelligent decisions- like recycling energies in food production, processing to consumption chain along with efficient energy storage systems. Implementing system integration by transitioning to renewable energy sources and electrification can play an important role.

- Thermal energy can be used as a potential source of energy for cold chain operability. Innovative thermal storage has extensive opportunities and must be endorsed.
- Biomass waste can be used for generating heat and cold by adding temperature control to local storage. This can be done without using ice to store the cold and improvise local/ indigenous low cost solutions.
- Selection of appropriate energy storage material is important for horticultural produce. Cold transport using electric vehicles can reduce 15-20 percent of energy consumed and help decrease net carbon emissions.

#### Focus on on-ground tech deployment

- Farmer Producer Organizations lack awareness, finance and access to technology for greener cold chain solutions. Currently, procurement technologies including energy

efficiencies and deployability of these are being worked out and will influence cold chain penetration across more sectors in the country.

- Affordable and indigenously developed sabji coolers have been able to effectively transport leafy vegetables and fruits with 20 percent reduction in wastage and prolonged shelf life.
- Innovations such as COLDIVATE APP can support cold room providers with day-to-day operation. The digital inventories of the app can monitor cold storage tempe and information on perishability of items.



## Focus on financial instruments for Cold Chain

- Green financing of cold chain faces three key challenges: scale, energy transition and business models. As in specific cases, India and Bangladesh offer viable business opportunities for descaling energy use and costs in this area.
- There is a need for a catalyst/enabler for accessing finance in the climate domain especially government-to-government funding for infrastructure, and private financing (private companies, direct loans etc.), for achieving sustainable goals.
- There is a need for an integrated approach for energy transition within the cold chain sector, creating the blueprint for financing energy-efficient technology leveraging both government and public-private partnerships.
- For climate and food security solutions, financing can be through country partnership plan. As case studies, post-harvest interventions, aggregation of farmers through FPOs and capacity and value chain projects have been started in Maharashtra. In general, efficient post-harvest management has been implemented. Matching grants can mainstream financing and how energy transition can happen within the cold chain sector.
- Sustainability from the project design stage till implementation is important to attract finance. Also, public financing can be pivoted to address risks and be bankable so that more banks are attracted for financing.





# Scoping a framework for PPP on Agri Technologies, Mitigating the risk of Climate Change and Leveraging Global trade opportunities

## ► The Need

Globally, the Food systems are undergoing a paradigm shift due to several factors including biodiversity crisis, climate change, and pandemic, among others. These factors collectively have also adversely affected food security.

Globally, around 828 million people go hungry every day and by 2030, around 600 to 660 million people may still face hunger issues. The biggest challenge is to increase the food supplies with reduced land holdings. This will require large-scale interventions around technology and agriculture practices. Unfortunately, the developments made in the current situation are not at the required speed and scale to address global challenges of SDGs by 2030.

Accelerated, innovative and sustainable solutions are needed by harnessing the power of technological innovations to make agri-food systems more efficient, sustainable, inclusive and resilient to impacts of climate change.

It is also important to make food affordable and accessible for the entire population. This requires accelerated technological innovation in terms of resource efficiency, precision farming which will help in reducing food loss. The agri-food systems are very diverse in nature and hence, technological innovations should ensure avoiding the digital divide, which benefits all communities and countries.

This session provided a platform to deep-dive into emerging areas of cooperation. It showcased successful examples around acceleration of technology deployment in agri & foods sector, focussed on tech-led interventions to deliver state-of-the-art products and services to small farmers and dwelled into a framework for deployment of next-generation technology under a collaborative approach in the G20 countries.



## ► The Stories

### Centre for Digital Agriculture, University of Illinois-

The Broad goal of the centre is to solve agriculture related issues using digital technology which includes collaborative research across engineering and agriculture with the goal of increasing productivity and sustainability, primarily through technical innovations and through industry partnerships. India has enormous technological capabilities and a profound need to expand food production. There is an opportunity to judiciously use low-cost and scale-neutral technologies which are sustainable, profitable, to enable productive agricultural system.

Industrialised agriculture and monoculture farming has led to serious problems such as soil erosion and degradation, pollution from fertiliser overuse, herbicide resistance in weeds, freshwater depletion and poor nutrition in low-cost foods. India is poised to take a positive approach to tackle these challenges through appropriate policies and investments in the low-cost technologies suitable for small-scale farming, ideal in Indian scenario.

### Science, Technology and Innovation Policy (STIP) 2020 Policy –

The Policy has been formulated with support of the principal Scientific Advisor to government of India. This policy was specifically made not only for agriculture but for Allied sectors as well. STIP 2020 by way of its decentralized, bottom-up, and inclusive design process aims to strategize priorities, sectoral focus, and methods of research and technology development for larger socio-economic welfare. There is a big gap in adoption of technology in terms of what is developed in

laboratory and what is actually being adopted on field and this gap can only be bridged through public private partnership.

### National Agricultural Research System (NARS)-

India has one of the world's largest Agricultural Research System viz., National Agricultural Research System (NARS) including ICAR institutes and State Agricultural Universities (SAUs). NARS has contributed immensely to make India self-sufficient in food production and serves agricultural technology and information needs of the country. NARS has focussed not only on increasing production of foodgrains but also the productivity and per capita availability of food grains.

### Collectivization initiatives through FPOs-

The affordability of Agriculture technology can be enhanced through the collectivisation approach of small farmers in FPOs, and the technologies can be scaled. State and central governments can come up with Programs where indigenous technology can be scaled down to the farmer level.

### Green Chemistry & Genome Editing-

In terms of mitigating the climate risk a lot of shifts have been happening towards sustainable technologies, globally the emphasis is on green chemistry which is environment friendly. One of the examples in this context is usage of biological products to reduce the usage of nitrogen. Another one is genome editing in Basmati Rice which prevents it from blast disease and hence prevents usage of chemicals. Various other similar



technologies are being worked at IARI PUSA which enhances the herbicide tolerance of the crops and maintain the flavour and texture of the produce. The Government of India has also identified genome editing as non-regulated technology that can be used as a breeding technology in the high value crops.

#### Drones-

Drones services in India are catching up significantly

#### Smart Seeders-

The SMART seeder combines precision with accuracy by delivering high resolution seed and fertilizer prescriptions down to the square foot across every row of the drill. The flawless integration of soil maps allows for maximum return on agronomic data and boosts production of every single furrow. While they are quite popular in Canada and other European countries. They have tried to modify their technology as per India Farming ecosystem and trials have been conducted in Punjab with farmer groups.

They gained a lot of popularity amongst Farmers and large groups placed order for their technology in bulk. This indicates that there is a huge opportunity with the state government for PPP partnership with such kind of Agtech companies where they can either subsidize the cost of that technology or they can source it for KVKS from where it could be made accessible to farmers on rental basis.

#### Canada-

Canadian government launched protein super cluster program where the intent was to add

value to the Canadian grown pulses into plant-based protein. To take the initiative forward, all the stakeholders including growers, provincial governments, the federal government of Canada, research institutions and the industry, came together and formed the protein industry. The focus was on four aspects -improving seed quality, smart and sustainable production, enhancing farm productivity and product development through advance processing technologies. As a result, Canada has emerged as the leader in pulses processing and is offering the world not only pulses but also pulses protein, pulses flour and many more pulses-based value-added products. The learnings from the pulses project can be leveraged to promote millet-based products globally.

#### ITC MAARS-

It is a mobile application launched by ITC which enables Farmers empower farmers by providing them with access to modern tools, right quality of inputs at right prices, besides market and financial linkages. ITC is taking the approach of disseminating this platform through farmer Producer Organisations and currently they have formed around 1000 FPOs.



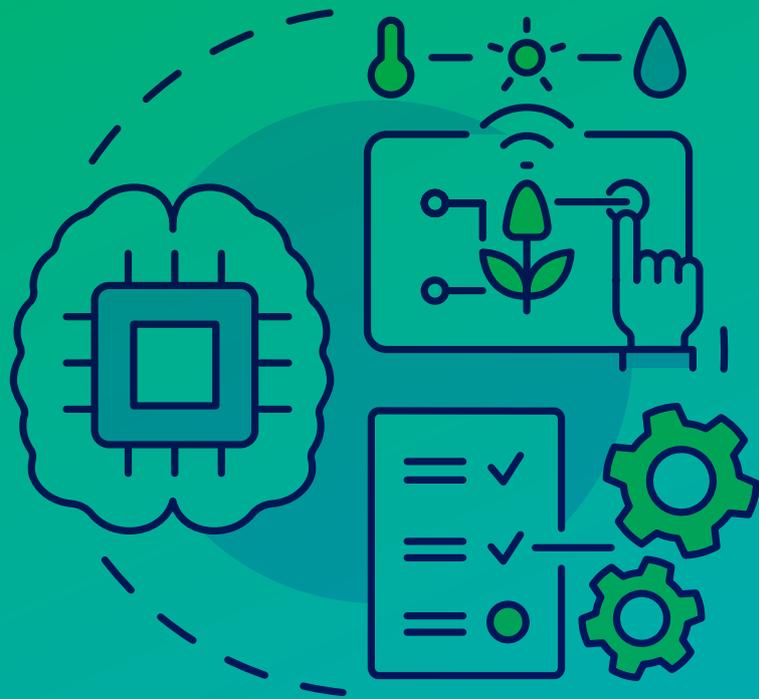
## ▶ The Path Ahead

**As the B20 recommendations to G20, the following takeaways were highlighted:**

- Judicious use of low cost- scale neutral technologies can enable sustainable, profitable, productive Agriculture such as small autonomous robots, mechanical weeding, cover crop planting, video-based monitoring, and AI-driven technologies.
- Motivate younger generation to take agriculture as a source of employment.
- Partnering with Public institutions to bring technologies into university system and

National Agricultural Research System so that the technology could be made accessible to large farmer base

- Demonstration of Technology through demonstration Centres which could be set up through public private partnership at various levels
- Partnering with Local universities and institutions is important for commercialisation of technology, UN has developed a GPA program (Global Plan for Action) wherein G20 countries can explore and collaborate for technology transfer between Nations.



# Developing an Open and Inclusive Data and Digital Ecosystem

## ► The Need

The role of innovations and their actual deployment is integral to accelerating adoption of technologies at the farm level. Developing an open and inclusive data and digital ecosystem is an important element for innovation in this space. Lessons from across the world also call for building a robust Agri-tech policy framework that includes collaboration between all market participants. Cross-country collaboration on Agri-tech technologies and operating models could also be driven through such a policy framework. This requires integration across geographies, within and beyond the country's borders, and across the public, private, and non-profit sectors.

To scale up the business models and enhance inclusivity, data becomes a very important piece. The food systems have a relationship with climate change and the economic policies. The policies that are being framed to tackle climate change have an interconnection with efficient data systems which is also critical for successful digital transformation. It is important to harness and leverage the potential of technologies such as artificial intelligence and machine learning investment in national data systems.

Unfortunately, the lack of investments in statistical systems is quite low and it is suggested that there should be a minimum of 0.5 percent of the annual expenditures to achieve this transformation.

Strengthening and development of National Data Systems' statistical capacity and digital skills are critical for countries to respond to crises and other issues. It is alarming to know that 92 countries have not conducted an agricultural census in the last 10 years 52 of which have not been conducted in last 20 years. About 96 percent of the countries don't have sufficient data to compute indicators for their productivity and the income of smallholder farmers. The current data systems are very fragmented which overlooks the local needs and leads to short-term inefficient changes. So, to achieve transformation it's necessary to focus on the foundational aspects of data systems.

This session threw light on opportunities created by the open data architecture; experiences around architecting digital systems and ecosystems; need for developing standards and protocols for data sharing as well as cooperation needed for enabling cross-border transactions.





## ► The Stories

- **Global Open Data for Agriculture and Nutrition (GODAN) initiative:** Godan's Agricultural open data mandate anchors on the vision of people and prosperity-driven transformation. The vision of GODAN ensures that the south-south Triangular cooperation partners benefit through collaborative engagements. It creates a framework for capacity capabilities enhancement in agriculture data sourcing for inclusive sustainable development, it also provides support to partners to co-create sustainability frameworks for interoperable, innovation-anchored, open data on agriculture and nutrition. They have created a national-level data think initiative that is involve integrated food systems engaging all the stakeholders. Their data cube is being continuously used by many innovators to articulate agricultural data initiatives and to develop algorithms that have been able to help in creating new and digital products.
- **Agristack:** It is a collection of farmer's databases that is quite similar to the database of residents that are Aadhaar, where each farmer will have a unique digital identification. It will contain information about the agriculture land holdings (Plots) of farmers, the GPS coordinates of each plot, and crops grown in each plot. The data will be protected through regulations so that it is not misused. Furthermore, a data exchange will be formed where all stakeholders will come together for data sharing which might be shared free of charge or at a cost. A farmer's consent is mandatory for sharing ant personal or nonpersonal data which can be shared directly by the farmer through the digital platform. The Agristack will enable improvement in digital farming technologies which may significantly improve farm yields and boost farmers' incomes.
- **Africa-** The country is gaining a significant volume of traction and investment from the private sector. This has happened by enabling production as per the requirements of the Agro-processing sector and exports. The data-driven innovations between the public and private sectors have enabled more partnerships between the stakeholders leading to the strengthening of agri-value chains. Africa is also working on a data policy to put in place the governance for data exchange between stakeholders.
- **Microsoft Azure Data Manager for Agriculture-** Microsoft Launched this platform in partnership with Bayer Corporation which extends the Microsoft Intelligent Data Platform with industry-specific data connectors and capabilities to connect farm data from disparate sources. It leverages high-quality datasets to accelerate the development of digital agriculture solutions. This platform brings the benefits of technology to small Farmers which bridges the gap between large landholdings and small landholdings which is very crucial in maintaining equality and achieving the objective of digitization. Connectivity, Affordability, and Availability of data and technology readiness are four major challenges in India which the platform is trying to address through the usage of AI (Artificial Intelligence)
- **Agnext –** AgNext has innovated & developed full-stack integrated algorithms, software & hardware platform, which addresses quality assessment issues across the agri value chain, enabling businesses to analyze food on-the-spot in just 30 seconds. They focussed on output which can only be measured using various data sets and used multimodal AI techniques. They started with two commodities that are wheat and rice and collected more than 4 million data sets from across the country and created processes using hardware and software which were then automated step by step. Today, they are working on more than 25 commodities covering more than 110 parameters. The objective of the initiative is to link the entire supply chain based on the quality of the output so that the buyer gets the desired output, and the seller gets the desired prices.
- **Ninjakart-** Ninjakart for the last 7-8 years has been trying to solve the problem of market linkages for the farmers where they struggle to find the correct market and buyer for their produce. They are now India's largest Fresh Produce Supply Chain Company and are pioneers in solving one of the toughest supply chain problems of the world by leveraging innovative technology. We connect producers of food directly with retailers, restaurants, and service providers using in-house applications that drive end-to-end operations.

## ▶ The Path Ahead

**As the B20 recommendations to G20, the following takeaways were highlighted:**

- Comprehensive data systems and frameworks should be designed
  - There is a need for multistakeholder participation and collaboration which needs to be encouraged. Many startups and private players are collecting a lot of data that could be exchanged through a common platform for which protocols need to be developed.
  - Farmers should be at the forefront of every data point and there should be a regulatory framework for data usage
  - There is a big challenge in digital literacy, requiring solutions that ensure farmers understand the need for digitization.
  - To curb the misuse of data it is necessary to form regulations that balance the rights of the farmers and the appropriate usage of data for technological innovations
- Technologies like AI can help in taking data-driven decisions and thus enable farmers to produce more with fewer resources which in turn will prevent the depletion of natural resources and also prevent health hazards.
  - It is imperative to build quality maps for India which are data sets based on the quality parameters of the crops which will enable the buyers to connect with the right set of producers, thus solving the gaps in the supply chain and also positively impacting the income of the farmers.





FACE is CII's Centre of Excellence dedicated to building efficiencies across the agricultural value chain from farm to fork. FACE is charged with the mission of improving competitiveness of India's agriculture and food sector by catalysing innovation, building capacity and enhancing productivity across the value chain. FACE works with farmers, companies, development institutions and the government to

- Improve on and off-farm productivity through the introduction and dissemination of global best practices and technological innovation
- Improve global competitiveness of India's agriculture by investing in capacity building initiatives and skill development for supply chain participants across the value chain
- Strengthen linkages across the agriculture and food value chain with an objective of reducing spoilage, increasing value addition and enhancing farmer incomes

FACE's service portfolio comprises commodity specific value chain assessments and supply chain advisory services for food and agri businesses, training and consultancy services in food safety and sectoral research across different market segments.

**CII Jubilant Bhartia Food & Agriculture, Centre of Excellence (FACE)  
Confederation of Indian Industry**

Andhra Association Building , 4th Floor  
24-25 Institutional Area

Lodi Road, New Delhi-110003, India

T: +91 45771000 | E: [face-info@cii.in](mailto:face-info@cii.in) | W: [www.face-cii.in/](http://www.face-cii.in/)



## Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with around 9,000 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from 286 national and regional sectoral industry bodies.

For more than 125 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. CII charts change by working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

Extending its agenda beyond business, CII assists industry to identify and execute corporate citizenship programmes. Partnerships with civil society organizations carry forward corporate initiatives for integrated and inclusive development across diverse domains including affirmative action, livelihoods, diversity management, skill development, empowerment of women, and sustainable development, to name a few.

As India strategizes for the next 25 years to India@100, Indian industry must scale the competitiveness ladder to drive growth. It must also internalize the tenets of sustainability and climate action and accelerate its globalisation journey for leadership in a changing world. The role played by Indian industry will be central to the country's progress and success as a nation. CII, with the Theme for 2023-24 as 'Towards a Competitive and Sustainable India@100: Growth, Inclusiveness, Globalisation, Building Trust' has prioritized 6 action themes that will catalyze the journey of the country towards the vision of India@100.

With 65 offices, including 10 Centres of Excellence, in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with 350 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.

## Confederation of Indian Industry

The Mantosh Sondhi Centre 23, Institutional Area, Lodi Road, New Delhi – 110 003 (India)

• T: 91 11 45771000 • E: info@cii.in • W: www.cii.in

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