POLICY BRIEF #25

Sustainable Food Systems and India's Trade Agreements

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Authors:

ARPITA MUKHERJEE

ANUSHKA PAL

KETAKI GAIKWAD

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About the Authors

Dr. Arpita Mukherjee is a Professor at ICRIER. She has over 25 years of experience in policy-oriented research, working closely with the Government of India and policymakers in the European Commission and its member states, the United States of America (USA), the Association of Southeast Asian Nations (ASEAN) and in East Asian countries. She has conducted studies for international organisations, Indian industry associations, non-government organisations and companies.

Her areas of expertise are domestic reforms, trade and trade policy, and trade agreements. She specialises in sector and product-specific market trends, go-to market strategy and government policies.

Dr Mukherjee has a PhD in Economics from the University of Portsmouth, the United Kingdom (UK), and prior to joining ICRIER, she worked with the UK-based think tank Policy Studies Institute and taught at the University of Portsmouth. She has over 100 publications in national and international referred journals, books and book chapters and government reports. Dr Mukherjee is a member of various government committees and policy panels and is on the editorial board of 10 journals. She has presented her work in various national and international conferences/seminars and is on the advisory board of several organisations. She is a regular contributor to newspapers and magazines.

Ms. Anushka Pal is a second-year postgraduate student pursuing an M.A. in Economics with specialisation in Trade and Finance at the Indian Institute of Foreign Trade, Kolkata. She is currently gaining valuable experience as a research intern at the Indian Council for Research on International Economic Relations (ICRIER). Her academic and research interests span public economics, development and policy-making, driving her to explore the connections between these areas through both her studies and practical experience. Before joining ICRIER, Anushka interned at NITI Aayog, India's premier government think tank, where she contributed to a project focused on Aspirational Districts and Block Programmes. This experience has deepened her commitment to policy-making and her ambition to create impactful economic solutions. She also holds a B.Sc. in Economics (Hons) from Presidency University, Kolkata. Beyond her academic and professional life, Anushka is an avid reader and a traveller with a keen interest in music, particularly in playing the piano.

Ms. Ketaki Gaikwad is currently working as a Research Assistant at ICRIER. She completed her MSc Economics with distinction from MIT World Peace University, Pune.

She has around two years of research experience, covering secondary data and information analysis and primary surveys. At ICRIER, she has been working on projects related to policy mapping and analysis, impact analysis and report writing. She has co-organised the 1st Asia Pacific E-Commerce Policy Summit, 2024, and is working on e-commerce and cross-border trade. Before joining ICRIER, she has worked with think tanks and research organisations like the Centre for Policy Research and Governance, Delhi, and the Gokhale Institute of Politics and Economics, Pune. During her studies, she has been involved in diverse research projects and presented research papers at various conferences, including the 2nd BRICS Research Conference organised by the BRICS Research Institute at the University of Kota, Rajasthan.

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Abstract

India is both a leading producer and exporter of agri-food products as well as the world's sixth largest food and grocery market. Agriculture in general, therefore, and agri-food products in particular, is key to India achieving high inclusive growth as well, generating employment and attracting investment. However, India today faces several challenges related to sustainability across the entire food supply chain – farm-to-fork – ranging from fragmented supply chains, lack of storage facilities, rejection of food products by key importing markets, high use of pesticides, poor quality of inputs and significant food loss and waste. While India has been able to meet food security, the country has not achieved nutrition security and is suffering from both malnourishment and over-nutrition related illnesses. Yet, there is no vision document or roadmap to achieve a sustainable food system. There are also limited discussions on how sustainable food systems should be addressed under India's trade agreements.

The objective of this policy brief is to fill this lacuna. It presents India's strength as a producer and exporter of agri-products, examines the policies towards building a sustainable food system and their impact, analyses best practices and suggests how they can be scaled-up/replicated. It identifies regulatory and other issues and makes policy recommendations that will help develop a sustainable food system, take the country from food security to nutrition security, help enhance quality production, exports and earnings of farmers and enable India to engage better and benefit from trade agreements.

***Keywords**: Sustainable Food System, India, policy, trade*

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Author's email: arpita@icrier.res.in; kgaikwad@icrier.res.in; anushkapal75@gmail.com

List of Abbreviations

AAGR	Average Annual Growth Rate
AFSIB	Asian Fisheries Society Indian Branch
APART	Assam Project on Agribusiness and Rural Transformation
APEDA	Agricultural and Processed Food Products Export Development Authority
APMC	Agricultural Produce Marketing Committee
APOF	Association for Promotion of Organic Farming
ARIAS	Assam Rural Infrastructure and Agricultural Services Society
ASEAN	Association of Southeast Asian Nations
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homoeopathy
BIS	Bureau of Indian Standards
BPKP	Bharatiya Prakritik Krishi Paddhati
CAA	Coastal Aquaculture Authority
CAGR	Compounded Annual Growth Rate
CCSAMMN	Climate Change & Sustainable Agriculture: Monitoring, Modelling & Networking
CEPC	Cashew Export Promotion Council
CHIRAAG	Chhattisgarh Inclusive Rural and Accelerated Agriculture
CICEF	Central Institute of Coastal Engineering for Fishery
CIKS	Centre for Indian Knowledge Systems
CIPHET	Central Institute of Post-Harvest Engineering and Technology
CLFMA	Compound Livestock Feed Manufacturers Association
CRB	Centre for Responsible Business
CSS	Centrally Sponsored Scheme
ECTA	Economic Co-operation and Trade Agreement
EIA	Export Inspection Agency
EIC	Export Inspection Council
ELP	Economic Laws Practice
EU	European Union
FAO	Food and Agriculture Organization
FBO	Food Business Operator
FDI	Foreign Direct Investment
FICCI	Federation of Indian Chambers of Commerce & Industry

FOLUR	Food Systems, Land Use and Restoration
FOPNL	Front of Pack Nutrition Labelling
FSSAI	Food Safety and Standards Authority of India
FTA	Free Trade Agreement
FY	Financial Year
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GFSP	Global Food Safety Partnership
GPH	General Principles of Food Hygiene
GVA	Gross Value Added
HACCP	Hazard Analysis and Critical Control Points
HFSS	High Fat, Sugar, Salt
HP	Himachal Pradesh
IBA	Indian Beverage Association
ICAR	Indian Council of Agricultural Research
ICAE	International Conference of Agricultural Economists
ICDS	Integrated Child Development Services
ICMR	Indian Council of Medical Research
IDA	International Development Association
IFSI	Inland Fisheries Society of India
IIASD	International Institute of Advanced Agriculture Skill Development
IIRR	Indian Institute of Rice Research
IMSA	India Meat Science Association
INDIAB	India Diabetes
IOPEPC	Indian Oil Seeds & Produce Export Promotion Council
IPM	Integrated Pest Management
ITC-FSAN	International Training Centre on Food Safety and Applied Nutrition
IWMP	Integrated Watershed Management Programme
KII	Key Informant Interview
LIFE	Lifestyle for the Environment
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MoAFW	Ministry of Agriculture and Farmers' Welfare
MoCI	Ministry of Commerce and Industry
MoEFCC	Ministry of Environment, Forest and Climate Change

MoFAHD	Ministry of Fisheries, Animal Husbandry and Dairying
MoFPI	Ministry of Food Processing Industries
MoHFW	Ministry of Health and Family Welfare
MoU	Memorandum of Understanding
MOVCD	Mission Organic Value Chain Development
MoWCD	Ministry of Women and Child Development
MPEDA	Marine Products Exports Development Authority
MRA	Mutual Recognition Agreement
MT	Million Tonnes
NABARD	National Bank for Agriculture and Rural Development
NABCONS	NABARD Consultancy Services
NAPCC	National Action Plan on Climate Change
NCNF	National Coalition for Natural Farming
NCOF	National Centre of Organic Farming
NCONF	National Centre for Organic and Natural Farming
NCPAH	National Committee on Plasticulture Applications in Horticulture
NDDB	National Dairy Development Board
NFDB	National Fisheries Development Board
NFL	National Fertilizer Limited
NFSM	National Food Security Mission
NGO	Non-Government Organisation
NHM	National Health Mission
NIANP	National Institute of Animal Nutrition and Physiology
NIFPHATT	National Institute of Fisheries, Post Harvest Technology and Training
NITI	National Institute for Transforming India
NMSA	National Mission for Sustainable Agriculture
NPOP	National Plan for Organic Production
NTB	Non-Tariff Barrier
NWDPRA	National Watershed Development Project in Rain-fed Areas
OFPAI	Organic Farmer Producer Association of India
PFI	Poultry Federation of India
PGS	Participatory Guarantee System
PKVY	Paramparagat Krishi Vikas Yojana

PLISFPI	Production Linked Incentive Scheme for Food Processing Industry
PM-AASHA	Pradhan Mantri Annadata Aay Sanrakshan Yojana
PMJDY	Pradhan Mantri Jan Dhan Yojana
PMKSY	Pradhan Mantri Kisan Sampada Yojana
PMMST	Pradhan Mantri Matsya Sampada Yojana
POA	Programme Of Action
PPP	Public-Private Partnership
RAI	Retail Association of India
RAD	Rain-fed Area Development
RASFF	Rapid Alert System for Food and Feed
RCFL	Rashtriya Chemicals and Fertilizers Limited
RKMVERI	Ramakrishna Mission Vivekananda Educational and Research Institute
RKVY	Rashtriya Krishi Vikas Yojana
RySS	Rythu Sadhikara Samstha
SAPCC	State Action Plan on Climate Change
SEFA	Seafood Exporters Association of India
SFS	Sustainable Food System
SHM	Soil Health Management
SME	Small and Medium Enterprise
SOCCA	Sikkim State Organic Certification Agency
SPS	Sanitary and Phytosanitary
TERI	The Energy and Resources Institute
UAE	United Arab Emirates
UN	United Nations
UNEP	United Nations Environment Project
UNSDG	United Nations Sustainable Development Goals
UOCB	Uttarakhand Organic Commodity Board
USA	United States of America
UT	Union Territory
WOAH	World Organisation for Animal Health
WTO	World Trade Organization

Sustainable Food Systems and India's Trade Agreements

Arpita Mukherjee, Anushka Pal and Ketaki Gaikwad

1. Introduction

India is among the fastest-growing economies in the world with a projected real GDP growth of 7 per cent in 2024 [International Monetary Fund, July 2024]. It is also the country with the largest population in the world. Thus, there is a sizeable market and growing demand for food products in India. The 'food and grocery' market in India was the sixth-largest in the world in 2024 (APEDA, 2024),[1] owing to factors such as an increased preference for diverse food products, expansion of the processed food sector and the growing presence of organised retail.

The Union Budget Speech, July 2024, prioritised *"Productivity and Resilience in Agriculture"* by transforming the agricultural research setup, releasing 109 new high-yielding and climate-resilient varieties of 32 field and horticulture crops, and initiating 10 million farmers across the country into natural farming, supported by certification and branding in the next two years. Agriculture, with its allied sectors, is the largest source of livelihood in India.[2] In the last five years, the agriculture sector has grown at an average growth rate of 4.18 per cent per year [Economic Survey 2024; Chapter 9]. A substantial number of rural households still depend primarily on agriculture and allied sectors (including food processing) for their livelihood, while 82 per cent of farmers are small and marginal farmers with an average landholding of less than 2 hectares.[3]

> *The Indian agriculture sector provides livelihood support to about 42.3 per cent of the population and has a share of 18.2 per cent in the country's GDP at current prices.*
>
> *Source: Chapter 9; Economic Survey 2024*

With its varied climate and ecological conditions, India produces a diverse range of crops and is among the top global producers of several agri-food commodities. The Economic Survey 2024 chapter, titled "*Agriculture and Food Management: Plenty of Upside Left If We Get It Right",* highlights that in FY[4] 2022-23, food grain production hit an all-time high of 329.7 million tonnes (MT), and oilseeds production reached 41.4 MT. In FY 2023-24, food grain production was slightly lower at 328.8 million tonnes owing to delayed monsoons; however, the country has a comfortable stock of food grains, around 40 per cent of which is distributed to two-thirds of the population free of cost. In FY 2022-23, India produced approximately

[1] https://www.ibef.org/industry/indian-food-industry.aspx (last accessed June 16, 2024)

[2] https://www.fao.org/india/fao-in-india/india-at-a-glance/en/#:~:text=India%20is%20the%20world's%20largest,%2C%%2020vegetables%2C%20fruit%20and%20cotton (last accessed June 16, 2024)

[3] https://fas.org.in/small-farmers-in-indian-agriculture/#:~:text=Almost%2050%20per%20cent%20of,are%20less%20than%20two%20hectares. (last accessed June 16, 2024) and the Ministry of Agriculture and Farmers Welfare.

[4] FY is financial year which starts on April 1 and ends March 31

230.6 million tonnes of milk, making it the largest milk producer globally.[5] India is also the world's largest producer of pulses and spices, and ranks second in the production of rice, wheat and sugarcane.[6] It ranks first in the production of several vegetables and fruits including bananas, limes, lemons, papayas and okra (MoAFW, 2023).[7]

The country is also a leading producer of fish and livestock products. India is the second-largest producer of eggs and the fifth-largest producer of meat (MoFAHD, 2023).[8] The contribution of livestock to total GVA (at constant prices) in agriculture and allied sectors increased from 24.32 per cent in 2014-15 to 30.38 per cent in FY 2022-23 [Economic Survey 2024]. According to the Ministry of Fisheries, Animal Husbandry & Dairying (MoFAHD, 2023),[9] India is the world's third largest fish-producing country, accounting for 8 per cent of global fish production. In FY 2021-22, the fish production was 16.24 million MT, with 4.12 million MT from marine sources and 12.12 million MT from aquaculture. Total fish production increased to 17.54 million MT in FY 2022-23 (MoFAHD, 2023).[10] Aquaculture is growing in India, making it the second largest nation in aquaculture production in 2024[11] in the world after China; India is among the top global exporters of shrimps. Shrimps contributed to more than 65 per cent of India's total seafood exports in 2024 (MoFAHD, 2024).[12] Farmed shrimp production in India has grown from 142000 tonnes in 2010[13] to 650000 tonnes in 2020.[14]

India is among the global largest producers of many agri-food products, and has been able to attain food security.

With India's growing agricultural output, the food processing sector is also expanding. The food processing industry in India accounts for around 32 per cent[15] of the total food market (APEDA, 2024).[16] As per the Ministry of Food Processing Industries (MoFPI, 2024), the food processing sector has expanded at an average annual growth rate (AAGR) of around 7.26 per cent from INR 1300 billion in FY 2013-14 to INR 2080 billion in FY 2021-22.[17] In 2021, this sector constituted 9.87 per cent and 11.38 per cent of GVA in the manufacturing and agricultural, forestry and fishing sectors respectively.[18]

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[5] https://www.investindia.gov.in/sector/animal-husbandry-and-dairying/dairy#:~:text=India%20is%20the%20highest%20milk,in%20the%20year%202022%2D23.(last accessed June 17,2024)

[6] https://www.fao.org/india/fao-in-india/india-at-a-glance/en/#:~:text=India%20is%20the%20world's%20largest,%2C%20vegetables%2C%20fruit%20and%20cotton. (last accessed June 17, 2024)

[7] https://pib.gov.in/PressReleasePage.aspx?PRID=1985479 (last accessed June 7, 2024)

[8] https://pib.gov.in/PressReleasePage.aspx?PRID=1988609#:~:text=Egg%20and%20Meat%20Production,in %202022%2 D23. (last accessed June 7, 2024)

[9] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1910415 (last accessed June 7, 2024)

[10] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1986155 (last accessed on July 21, 2024)

[11] https://dof.gov.in/inland-fisheries (last accessed June 7, 2024)

[12] https://pib.gov.in/PressReleseDetailm.aspx?PRID=1992898#:~:text=Shrimp%20contributes%20to%20more%20than,areas%20are%20there%20in%20India (last accessed July 30, 2024)

[13] https://www.globalseafood.org/advocate/can-india-sustain-its-farmed-shrimp-boom/ (last accessed June 17, 2024)

[14] https://aquaasiapac.com/2021/07/31/indias-farmed-shrimp-sector-in-2020-a-white-paper/ (last accessed July 30, 2024)

[15] https://www.cciindia.org/food-processing.html (last accessed on June 10, 2024)

[16] https://www.indianembassyreykjavik.gov.in/docs/India%20Food%202024.pdf (last accessed June 16, 2024)

[17] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2003092#:~:text=Food%20Processing%20(FP)% 20sector%20emerged,AAGR)%20of%20around%207.26%25. (last accessed on June 10, 2024)

[18] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1781255#:~:text=2.24%20lakh%20crore%20in%202019,e ngaged%20i%20n%2%200food%20processing%20sector (last accessed on June 10, 2024)

India's retail sector is one of the fastest growing in the world, accounting for about 10 per cent of the country's GDP. The food and grocery retail segment accounts for 65 per cent of India's total retail market (Statista, 2024).[19] The demand for packaged food is growing in the country with the growth of modern store and non-store based retail growth, urbanisation and improved logistics; at the same time, there is a change in consumer perceptions towards food safety, standards and quality following the COVID pandemic [World Health Organization (WHO), 2023].

As per the Economic Survey 2024, India brought about 6.8-million hectares under organic farming in FY 2022-23.[20] Sikkim is the first state in the world to become fully organic, and other states like Tripura and Uttarakhand have set similar targets. As per APEDA (2024),[21] India produced around 3.6 million MT of third-party certified organic products, including oil seeds, fibre, sugarcane, cereals, millets, cotton, pulses, medicinal plants, tea, coffee, fruits, spices, dry fruits, vegetables and processed foods in FY 2023-24. Among states, Maharashtra is the largest producer of third-party certified organic products followed by Madhya Pradesh, Rajasthan, Karnataka, and Gujarat.

The Union Budget 2023 aimed at making India a global hub for millets, proposing the Indian Institute of Millets Research in Hyderabad as a Centre of Excellence, centred around the theme "Healthy Millets, Healthy People". To support India's efforts, the UN declared 2023 as the International Year of Millets to promote the nutritious, and climate-resilient "golden grains" referred to as "Smart Food/*Shree Anna*". To increase the production and productivity of millets (*Shree Anna*), the Department of Agriculture and Farmers' Welfare (DA&FW) implemented a sub-mission on nutri-cereals under the National Food Security Mission (NFSM) in all districts of 28 states and two union territories (Jammu & Kashmir and Ladakh).[22] A Production Linked incentive (PLI) scheme for millet-based products with an outlay of INR 8000 million was introduced in the 2023 Union Budget.

Agri-food products[23] are among the top commodities in India's export basket as of 2023. India has been among the top 15 leading agri-food global exporters for the past ten years.[24] As per the Economic Survey 2024, the

According to World Trade Statistical Review 2023, India was in the top 10 ranking of global exporters and importers of agricultural products in 2022. Indian agri-food products are exported to over 70 countries in the world.

[19] https://www.statista.com/topics/5615/food-retail-in-india/ (last accessed July 29, 2024)

[20] Source: Economic Survey 2024; https://www.indiabudget.gov.in/economicsurvey/doc/eschapter/echap09.pdf (last accessed date August 1, 2024)

[21] https://apeda.gov.in/apedawebsite/organic/Organic_Products.htm (last accessed date August 1, 2024)

[22] https://pib.gov.in/PressReleasePage.aspx?PRID=1982798#:~:text=The%20United%20Nation's%20General%20Assembly,23%20is%2017.32%20million%20tonnes. (last accessed 24 July, 2024)

[23] Agri-food mainly refers to agricultural food products (excluding fish and fish products) by the WTO definition. Agricultural products, according to the AoA (WTO Agreement on Agriculture), definition refer to HS chapters 1 to 24 (excluding fish and fish products) and a number of manufactured agricultural products. The product categories under agri-food are taken from World Integrated Trade Solution (Trade Statistics by Product) and the HS codes that are included are from 01-24 (excluding 03; fish and crustaceans, molluscs, and other aquatic invertebrates).

[24] https://www.indiabusinesstrade.in/blogs/policies-for-agri-exports-must-be-linked-to-cost-of-sustainable-production/ (last accessed June 17, 2024)

value of agri-food exports, including processed food exports in FY 2022-23, was US$ 46.44 billion, which accounted for 11.7 per cent of India's total exports. Some of the key agri-food export items include rice, spices, cashew, tea and fresh vegetables, while key agri-food imports include vegetable oil, fresh fruits, and pulses.[25] The major fruits and vegetables exported from India include grapes, pomegranates, mangoes, bananas, oranges, onions, potatoes, tomatoes, and green chillies.[26] India's exports of food grains have registered a steady growth, which is reflected in the increase in India's share in world food grain exports from 3.38 per cent in 2010 to 7.79 per cent in 2022.[27]

Agriculture and food products of India are exported to over 70 countries in the world (Mukherjee et al., 2022). The United States of America (USA), the United Arab Emirates (UAE) and the European Union (EU) are some of the key export markets, but unlike other regions like the EU or The Association of Southeast Asian Nations (ASEAN), India's trade with South Asian countries is less than 5 per cent.

Overall, India has a positive trade balance in agri-food products. Imports of agri-food have been low in the past due to high tariffs and non-tariff measures (like phytosanitary[28] requirements). However, this trend is changing, and imports are rising as India has been liberalising tariffs on food under different trade agreements. Moreover, per capita income is rising and consumers are showing an increasing preference for a wide variety of food products, such as a wide variety of fruit-based carbonated beverages, that are not manufactured in India.

While the country's food demand is growing, ensuring sustainability in the food system faces several challenges including the non-implementation of good agriculture practices in the field, lack of quality inputs, food loss in the supply chain, rejection of exports in key markets for not being able to meet phytosanitary requirements, food loss and waste in the supply chain due to fragmentation and infrastructure gaps. A considerable part of the production is lost and/or gets wasted due to a fragmented supply chain, lack of traceability, and lack of storage and warehousing facilities, which often lead to food contamination [Manohar (2021); Mukherjee et al. (2019)]. While estimates on food loss and food waste vary, the Global Food Waste Index Report 2024 estimates food waste to be 78.2 million tonnes per year by Indian households, which amounts to around 55 kg per capita per year [United Nations Environment Programme (UNEP), 2024]. The report highlights that over 60 per cent

India, with growing population and rising food demand, is facing many issues in ensuring a sustainable food system.

[25] https://agriwelfare.gov.in/en/AgricultureTrade#:~:text=India's%20Agriculture%20Trade,-a.&text=India%20has%20emerged%20as%20a%20significant%20Agri%2Dexporter%20in%20a,nut%2C%20castor%20seed%20and%20groundnut. (last accessed June 17, 2024)

[26] https://apeda.gov.in/apedawebsite/six_head_product/Fresh_Fruits_Vegetables.htm#:~:text=6%2C283.76crores%2F%20USD%20757.93million,Contribute%20largelyto%20thevegetable%20export%20basket. (last accessed July 24, 2024)

[27] According to UNCOMTRADE statistics and https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1941490 (last accessed July 23, 2024)

[28] https://agri.nv.gov/Plant/Export_certification/Phytosanitary_Certificates/#:~:text=A%20phytosanitary%20certificate%20verifies%20agricultural,free%20from%20pests%20and%20diseases). (last accessed on August 14, 2024)

of the food waste is accounted for by households, 12 per cent by retail and 28 per cent by food services.[29]

Despite the country having over 52 regulations (see Brown et.al 2021) under ten ministries[30] addressing different aspects of a sustainable food system (SFS), it lacks a holistic regulatory approach towards SFS. For example, neither the Economic Survey 2024 nor the July 2024 Union Budget mentions SFS. There is no government document mapping the entire food supply chain traceability from the farm to the consumer.

Ironically, while India continues to face widespread hunger and malnutrition, there has been a simultaneous increase in the incidence of overnutrition-related diseases [Joshi et. al. (2016); Lakshmi & Prakash (2020); Ramachandran & Kalaivani (2023)]. According to the Food and Agriculture Organization of the United Nations (FAO) 2024, the average prevalence of undernourishment in the Indian population between FY 2021-23 stood at 13.7 per cent[31] while the study by Indian Council of Medical Research – India Diabetes (ICMR-INDIAB, 2023) – found that in 2021, an estimated 101 million people in India were diabetic while an estimated 136 million[32] people were pre-diabetic. The number of diabetic people increased by 44 per cent from 70 million in 2019 to 101 million in 2021.[33] The International Diabetics Federations' India Diabetes Report, 2000-2045, referred to India as the 'Diabetes Capital of the World', harbouring 17 per cent[34] of the worldwide diabetic population. There is clearly very little co-ordination among policy makers for the health and food sectors.

> *India ranks 111th out of 125 countries on the Global Hunger Index, indicating a serious level of hunger severity.*
>
> *Source: United Nations Environment Programme (UNEP), 2024.*

Overall, while the linkages between food and health in India is fragmented in terms of policymaking, the food system in the country is going through tremendous changes and with higher demand, the environmental footprint is increasing [see, for example, Athare et. al., 2020]. At the same time, SFS is now a key component of trade agreements like the one with the European Union that India is negotiating. Therefore, it is essential for India to adopt a holistic approach towards the entire food supply chain or SFS in the context of achieving its United Nations Sustainable Development Goals (UN SDGs) and benefiting from its trade agreements.

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[29] https://www.newindianexpress.com/nation/2024/Mar/28/indias-per-capita-food-waste-55kgyr-says-un (last accessed on June 10, 2024)

[30] For example, ministries such as the Ministry of Rural Development, Ministry of Housing & Urban Affairs, Ministry of Consumer Affairs, Food & Public Distribution, Ministry of Agriculture & Farmers' Welfare, Ministry of Health & Family Welfare, Ministry of Women & Child Development.

[31] https://www.fao.org/interactive/state-of-food-security-nutrition/2-1-1/en/ (last accessed on August 2, 2024)

[32] https://indianexpress.com/article/explained/explained-health/diabetes-obesity-hypertension-8670730/ (last accessed on August 13, 2024)

[33] https://www.tnpscthervupettagam.com/currentaffairs-detail/icmr-study-on-diabetes/?cat=national-news#:~:text=India%20now%20has%20more%20than,of%20the%20population%2C%20have%20prediabetes. (last accessed on August 13, 2024)

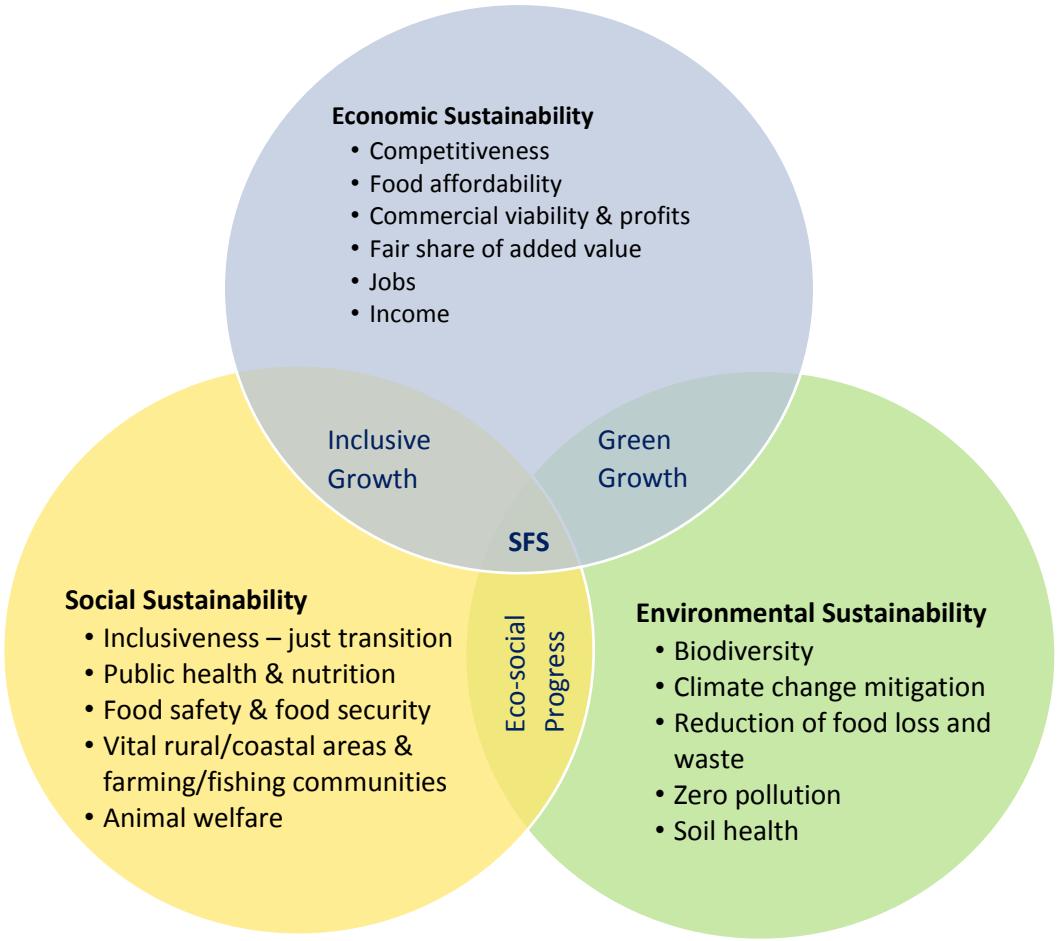
[34] https://timesofindia.indiatimes.com/india/why-india-is-diabetes-capital-of-the-world/articleshow/95509990.cms (last accessed on August 13, 2024)

1.1 Sustainable Food System

A sustainable food system or SFS is a food system that delivers food security, safety, and nutrition for all in such a way that it is economically sustainable/profitable, is socially sustainable, and has a positive or neutral impact on the environment or is environmentally sustainable (see Figure 1.1).

Figure 1.1: Sustainable Food Systems for Sustainable Societies

A sustainable food system (SFS) ensures environmental, social and economic sustainability



Source: Adapted from FAO, 2014 and SAM, 2020.

The components of an SFS include the following:

- sustainability of food production
- sustainability of food processing and marketing
- sustainability of food consumption, including health and diet
- reduction of food loss and waste

India has already taken a number of steps towards ensuring sustainability across the food chain aligned with the 'farm to fork' strategy and the UN's 2030 targets for sustainable food production.[35] Initiatives such as natural farming promote organic farming, while the Lifestyle for the Environment (LiFE) campaign encourages behavioural change towards climate-friendly practices in water, food, and recycling.[36] The National Mission for Sustainable Agriculture focuses on promoting sustainable agricultural practices,[37] while 'Eat Right India' aims to protect the health of the people and the planet by transforming the food ecosystem of the country through a systems approach.[38] Under SFS, livelihood for small and marginal farmers is a key concern for India. The country has initiated measures like income support for farmers to address that issue.

Despite these commitments and efforts towards sustainability, India is still dealing with challenges concerning its growing burden of disease, high food loss in the supply chain, low income of farmers, etc. It has been facing several export rejections at the border of importing economies on grounds of food safety, such as excessive use of pesticides and chemicals and poor quality of animal feed (Mukherjee, et al., 2019). For example, data from the Rapid Alert System for Food and Feed (RASFF)[39] of the European Union shows that between FY 2019-2024, there were 119 notifications[40] for fruits and vegetables exported from India, out of which 78 were rejected at the borders due to high residue of unauthorised pesticides and failure to meet EU food safety standards.

Moreover, due to the decentralised nature of agriculture governance, uniform policy implementation across states poses challenges. Addressing these issues requires a comprehensive approach to enhance sustainability throughout the food chain, which should include initiatives such as reducing the use of antimicrobials, chemical pesticides and fertilisers, improving animal welfare standards, promoting sustainable food production methods such as organic farming, and ensuring supply chain traceability and right diets. This policy brief aims for a better understanding and approach to SFS in India to develop a sustainable and resilient SFS for the domestic market and for exports to help India reap the benefits of trade agreements.

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[35] https://nuffoodsspectrum.in/2023/04/09/from-farm-to-fork-indias-fight-against-food-loss-and-waste.html (last accessed on June 17, 2024)

[36] https://www.weforum.org/agenda/2023/01/davos23-india-climate-mission-is-focused-on-sustainable-lifestyles/ (last accessed on June 17, 2024)

[37] More about National Mission for Sustainable Agriculture at https://nmsa.dac.gov.in/ (last accessed on June 17, 2024)

[38] https://eatrightindia.gov.in/EatRightChallenge3/aboutChallenge#:~:text=The%20Eat%20Right%20India%20(ERI,Eat%20Healthy%2C%20and%20Eat%20Sustainable. (last accessed on June 17, 2024)

[39] Rapid Alert System for Food and Feed (RASFF) is a tool enabling quick and effective exchange of information between member states and the European Commission when risks to human and animal health are detected in the food and feed chain and about the measures taken in response. The RASFF Window, a part of the RASFF Portal, is an online database of RASFF notifications classified as alert, information notification, or border rejection. Available at https://food.ec.europa.eu/safety/rasff_en (last accessed on August 1, 2024)

[40] There are two kinds of RASFF notifications: market notifications and border rejections. A member of the network sends a market notification when a risk is found in a food or feed product placed on the market. A border rejection is sent when a product is refused entry into the Community. There are two types of market notifications: alert and information notifications together with border rejections and news notifications making it a total of four.

1.2 Objective and Methodology

The objective of this policy brief is to provide a framework to develop policies towards an SFS in India so that the country is able to achieve its UNSDGs and benefit from trade agreements. It presents India's strength as a producer and exporter of agri-products, examines the policies towards a sustainable food system and their impact, analyses best practices and suggests how they can be scaled-up/replicated. Moreover, it identifies regulatory and other issues and makes policy recommendations to help develop a sustainable food system, and take the country from food security to nutrition security, help enhance quality production, exports and earnings of farmers and enable India to benefit from trade agreements.

This policy brief is being developed around ongoing research under various projects. It encompasses secondary data and information analysis. Twenty-five key informant interviews have been conducted to understand policies and their impact on different stakeholders including policymakers, co-operatives, farmer producer organisations, manufacturers/processors, retailers, exporters and importers, academics and legal experts.

1.3 Layout

The layout of the policy brief is as follows: The next section (Section 2) gives an overview of the sustainable food system globally and in India, highlighting budgetary trends, and the development and impact of schemes/policies/initiatives taken at both the central and state levels. The section also discusses collaborations in SFS between government ministries/departments, international organisations, NGOs, and private or public sector companies. Section 3 presents the key issues and barriers surrounding SFS in India. The last section (Section 4) presents a way forward and provides a set of recommendations on building an SFS in India.

2. Overview of the Policy Regime for SFS in India

Section 2.1 presents the institutional framework for the governance of SFS. Section 2.2 outlines the vision of the central government, while Section 2.3 reviews central government schemes aligned with government policies and initiatives, analyses the budget allocation and impact of these schemes/initiatives. Section 2.4 explores state government policies that support SFS in India along with the budget allocation and impact analysis of these policies. Section 2.5 discusses different models on multi-stakeholder collaborations and partnerships in SFS, and Section 2.6 covers international collaborations through trade agreements and mutual recognition agreements (MRAs) on standards. Finally, Section 2.7 discusses the key takeaways from the policy analysis.

2.1 Institutional Framework for Governance of SFS

India has a quasi-federal governance structure with a division of power and responsibility between the centre and the states. Agriculture, food, and retail are under the 'State List' (state jurisdiction) according to the Indian Constitution. The centre and state governments can enact regulations relating to SFS, but certain areas such as trade agreements or allowing foreign direct investment (FDI) are under the jurisdiction of the centre.

Different ministries and departments of the central government are responsible for designing policies/schemes/guidelines/initiatives with respect to various aspects of an SFS. Ministries, and departments, such as the Ministry of Agriculture and Farmers' Welfare (MoAFW), Ministry of Fisheries, Animal Husbandry and Dairying (MoFAHD), Food Safety and Standards Authority of India (FSSAI) under the Ministry of Health and Family Welfare (MoHFW), and Ministry of Food Processing Industries (MoFPI) regulate different aspects of the food supply chain. Export promotion councils under the Ministry of Commerce and Industry (MoCI) like the Agricultural and Processed Food Products Export Development Authority (APEDA), Marine Products Exports Development Authority (MPEDA), and boards like the Spice Board, Tea Board, and Coffee Board have been taking various measures to promote SFS, primarily for exports. Government think tanks like the National Institute for Transforming India (NITI) Aayog and research organisations like the Indian Council of Agricultural Research (ICAR) play a key role in designing agriculture policy with respect to SFS. To address diet sustainability and malnourishment/undernourishment, especially in children, adolescent girls, pregnant women, and lactating mothers, the Ministry of Women and Child Development (MoWCD) and MoHFW play an important role.

States have different departments for SFS such as the Department of Agriculture, Department of Horticulture, Department of Health, etc. albeit with different names. Given that agriculture, retail and health are under the state list, the policies, practices and implementation also vary across states.

2.2 Vision of the Central Government on SFS

The Government of India is already promoting "Green Agriculture". The National Mission for Sustainable Agriculture (NMSA), an overarching initiative and vision of the government to attain sustainability in agriculture, was launched in FY 2014-15 by the Department of Agriculture, Co-operation and Farmers' Welfare, under the MoAFW. It is one of the eight missions[41] listed in the National Action Plan on Climate Change formulated to address concerns regarding greenhouse gas emissions and related climate change threats from

[41] The eight missions in the National Action Plan include the National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a "Green India", National Mission for Sustainable Agriculture and National Mission on Strategic Knowledge for Climate Change. For more details refer https://dst.gov.in/climate-change-programme (last accessed on June 17, 2024)

various sectors, including the agriculture and livestock sectors [NAPCC, 2008[42]]. The NMSA aims to make agriculture more sustainable and productive by promoting location-specific, integrated/composite farming systems, soil and moisture conservation measures, comprehensive soil health management and efficient water management practices, and mainstream rain-fed technologies (see Box 2.1 for more details).[43]

Box 2.1: National Mission for Sustainable Agriculture

The NMSA's vision focuses on the following aspects:

- Transform agriculture into a climate resilient production system
- Grow and ecologically sustain agricultural production to its fullest potential
- Ensure food security and equitable access to food resources
- Enhance livelihood opportunities
- Contribute to economic stability at the national level.

The NMSA's thrust areas to address the issue of sustainable agriculture are dry land agriculture, access to information, biotechnology and risk management.

To promote sustainable agricultural practices, the NMSA implements a programme of action (POA) across ten dimensions: (i) improved crop seeds, livestock and fish culture, (ii) water use efficiency, (iii) pest management, (iv) improved farm practices, (v) nutrient management, (vi) agricultural insurance, (vii) credit support, (viii) markets, (ix) access to information and (x) livelihood diversification. Each dimension is analysed in the context of four functional areas: (i) research and development (ii) technology and practices (iii) infrastructure and (iv) capacity building. These cover both adaptation and mitigation measures for sustainable agriculture.

NMSA recognised that, along with modern technologies, research is crucial to promote sustainable agricultural production, traditional knowledge, and agricultural heritage.

Source: Department of Agriculture and Co-operation, Ministry of Agriculture (2010)

The NMSA comprises five major components[44] of which three work towards sustainable agricultural practices (see Figure 2.1). These components, through certain schemes, facilitate measures to promote and practice sustainable agriculture.

[42] https://pib.gov.in/newsite/erelcontent.aspx?relid=44098 (last accessed on June 20, 2024)
[43] https://pib.gov.in/PressReleasePage.aspx?PRID=1556469 and https://nmsa.dac.gov.in/ (last accessed on June 17, 2024)
[44] Rain-fed Area Development (RAD), Sub-mission on Agroforestry (SMAF), National Bamboo Mission (NBM), Soil Health Management (SHM), and Climate Change and Sustainable Agriculture: Monitoring, Modelling and Networking (CCSAMMN)

Figure 2.1: Examples of Schemes to Promote Select Components of the National Mission for Sustainable Agriculture

Rain-fed Area Development (RAD)	• The RAD introduced farming techniques to conserve natural resources along with farming systems by integrating multiple components of agriculture like crop, horticulture, livestock, and fishery with income generating activities and value addition. • Interventions include the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), National Watershed Development Project in Rainfed Areas (NWDPRA), *Rashtriya Krishi Vikas Yojana* (RKVY), etc.
Soil Health Management (SHM)	• SHM promotes location and crop specific sustainable soil health management, which includes organic farming through creating and linking soil fertility maps with macro-micro nutrient management, appropriate land use based on land capability, judicious application of fertilisers and minimising the soil erosion/degradation. • SHM comprises the *Paramparagat Krishi Vikas Yojana* (PKYY), which promotes organic farming through the adoption of organic village by cluster approach and Participatory Guarantee System (PGS). The *Bharatiya Prakritik Krishi Paddhati* (BPKP) programme under PKYY promotes traditional indigenous farming practices, freeing farmers from the need to rely on externally bought inputs.
Climate Change & Sustainable Agriculture: Monitoring, Modelling & Networking	• The CCSAMMN component provides creation and bi-directional (land/farmers to research/scientific establishments and vice versa) circulation of information and knowledge related to climate change and climate change mitigation/adaptation. • CSS, like the MNREGS, Integrated Watershed Management Programme (IWMP), National Food Security Mission (NFSM), National Health Mission (NHM), supports this component.

Source: Compiled from various sources (Available at https://nmsa.dac.gov.in/frmComponents.aspx, https://nmsa.dac.gov.in/pdfDoc/SHM_Guidelines472016.pdf, https://naturalfarming.niti.gov.in/bharatiya-prakritik-krishi-paddhati-bpkp/, https://nmsa.dac.gov.in/frmComponents.aspx) (last accessed on June 17, 2024) and KIIs

The Government of India has tried to address malnutrition across vulnerable groups through several initiatives launched under MoWCD, which include the *POSHAN Abhiyaan*[45] (National Nutrition Mission), the *Anganwadi* Services Scheme,[46] and Schemes for Adolescent Girls under the Integrated Child Development Services (ICDS).[47] The *POSHAN Abhiyaan* was restructured under Mission *Saksham Anganwadi,* and *POSHAN* 2.0, integrating *Anganwadi* services and the revised Scheme for Adolescent Girls, in 2023 to enhance maternal nutrition, infant and young child feeding norms and wellness through AYUSH.[48] ICDS, a flagship programme of the Government of India that offers nutrition services to support child development, provides for take-home rations for all children under 6 years of age and pregnant and lactating women to bridge the calorie and protein gaps in their diets.[49]

The FSSAI has, over the years, tried to align Indian food safety standards with global standards such as the Codex Alimentarius.[50] It has also initiated mass awareness campaigns such as "Eat Right" to improve public health in India and combat negative nutritional trends to fight lifestyle diseases.[51] It is now coming up with the health star rating (1/2 a star for least healthy food to 5 stars for healthiest food)[52]/front of the pack nutrition labelling (FOPNL),[53] which will rank packaged food items based on sodium, sugar, and fats printed on the front of the package and reduce high fat, sugar, and salt (HFSS)[54] in food. The rating system grants positive and negative points. For example, positive points are awarded for fruits and vegetables (FV), nuts, legumes and millets (NLM), fibre and protein being part of the product. Negative points are awarded to products that provide high amounts of energy, and contain sugar, salt, and fat.[55]

[45] https://wcdhry.gov.in/schemes-for-children/poshan-abhiyan/ (last accessed on August 2, 2024)
[46] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1808688 (last accessed on August 2, 2024)
[47] https://vikaspedia.in/social-welfare/women-and-child-development/child-development-1/girl-child-welfare/scheme-for-adolescent-girls (last accessed on August 2, 2024)
[48] https://pib.gov.in/PressReleasePage.aspx?PRID=1910409#:~:text=POSHAN%20Abhiyaan%20(erstwhile%20National%20Nutrition,6%20years)%20as%20well%20as (last accessed on August 2, 2024)
[49] https://poshan.ifpri.info/2023/04/03/take-home-rations-in-the-integrated-child-development-services-icds-study-of-coverage-and-uptake-in-tamil-nadu/ (last accessed on August 9, 2024)
[50] The Codex Alimentarius Commission (CAC)is an international food standards body established jointly by the Food and Agriculture organization (FAO) and the World Health Organization (WHO) to protect consumer health and ensure fair practices in food trade. The Agreement on Application of Sanitary and Phytosanitary Measures (SPS) of the World Trade Organization (WTO) recognises Codex standards, guidelines and recommendations as reference standards for international trade and trade dispute settlement.
[51] https://fssai.gov.in/cms/eat-right-india.php (last accessed on August 6, 2024)
[52] https://www.leatherheadfood.com/news-detail/blog-front-of-pack-nutrition-labelling-india/ (last accessed on August 6, 2024)
[53] Front-of-pack nutrition labelling (FOPNL) is a form of supplementary nutrition information that presents simplified nutrition information on the front of the package of pre-packaged foods.
[54] High fat, sugar and salt (HFSS) food means a processed food product that has high levels of saturated fat or total sugar or sodium. a product is considered to have high sugar, salt and saturated fats if the declared values of these ingredients are such that the product does not satisfy the following conditions: the value of energy (kcal) from total sugar is less than 10 per cent of total energy, saturated fat is 10 per cent of total energy, and sodium is less than 1 mg/1 kcal.
[55] https://fssai.gov.in/upload/advisories/2022/02/6214c8ca94fedMinutes_FOPL_22_02_2022.pdf (last accessed on August 6, 2024)

Box 2.2: The Speech of the Prime Minister at the 32nd International Conference of Agricultural Economists (ICAE)

India held the 32nd International Conference of Agricultural Economists (ICAE), themed "Transformation Towards Sustainable Agri-Food Systems" in August 2024. The Prime Minister highlighted the government's push for research and development into climate-resilient crops, and digitisation of agriculture, acknowledged the seriousness of nutrition-related challenges presenting millets as a solution, and expressed India's willingness to share this super food basket with the world.[56] Moreover, the conference also highlighted the holistic approach of 'One Earth, One Family, One Future' to address the challenges concerning agri-food systems.

At the conference, India's agricultural initiatives, including soil health cards, solar farming, e-NAM, *Kisan* Credit Cards, and the PM *Fasal Bima Yojana* were mentioned. In the last ten years, the government has provided approximately 1,900 new climate-resilient crop varieties to the farmers, including rice varieties that require 25 per cent less water than traditional ones.

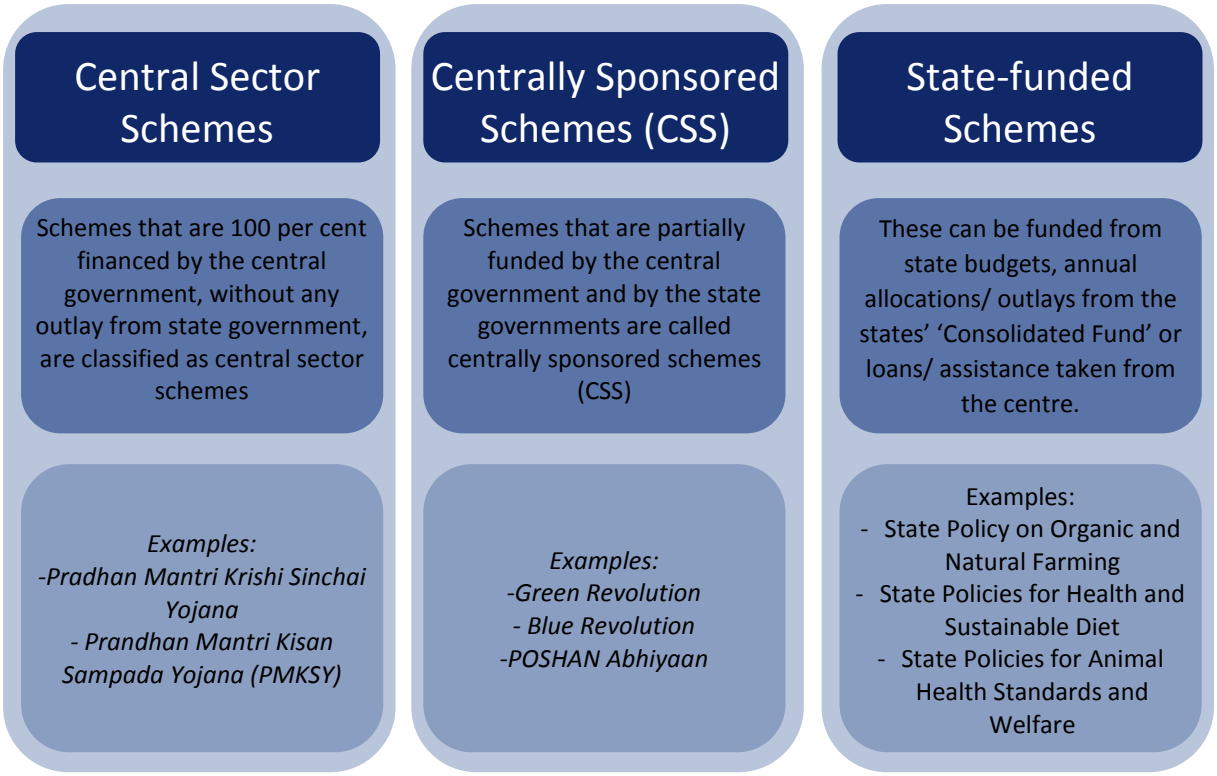
Source: https://www.pmindia.gov.in/en/news_updates/pm-inaugurates-the-32nd-international-conference-of-agricultural-economists/?comment=disable; https://www.livemint.com/industry/agriculture/pm-modi-economists-farmers-sustainable-agriculture-climate-resilient-crops-11722672003736.html (last accessed August 4, 2024)

2.3 Central Government Schemes for Supporting SFS

To support sustainable agriculture and address nutritional goals by combating malnutrition, the government has designed various schemes. There are broadly three types of schemes as shown in Figure 2.2; examples of these schemes are also mentioned.

[56] https://agrospectrumindia.com/2024/08/04/pm-modi-inaugurates-international-conference-of-agricultural-economists-icae-2024-in-new-delhi.html (last accessed on August 4, 2024)

Figure 2.2: Broad Classification of the Three Types of Schemes to Promote SFS



Source: Compiled from https://pfms.nic.in/NewDefaultHome.aspx (last accessed on July 25, 2024)

Among the central sector schemes, the major initiatives taken by the central government to promote SFS are the following:

i. The *Pradhan Mantri Krishi Sinchai Yojana*, which was launched by the Ministry of Jal Shakti in 2015-16 to enhance physical access to water and expand cultivable area under assured irrigation, improve on-farm water use efficiency, introduce sustainable water conservation practices, etc.[57]

ii. The *Pradhan Mantri Kisan Sampada Yojana* (PMKSY), which was launched under MoFPI in 2018-19 to enhance the value realisation of farmers and minimise post-harvest losses by creating additional infrastructure for agro-processing clusters for SFS[58]

iii. Agriculture Infrastructure Fund (AIF), which was launched to address existing infrastructure gaps and mobilise investment in agriculture infrastructure, under the *Aatmanirbhar Bharat* Package in 2020[59]

[57] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1946492 (last accessed on July 26, 2024)
[58] https://www.mofpi.gov.in/Schemes/about-pmksy-scheme (last accessed on June 17, 2024)
[59] https://pib.gov.in/PressReleasePage.aspx?PRID=2002012 (last accessed on August 3, 2024)

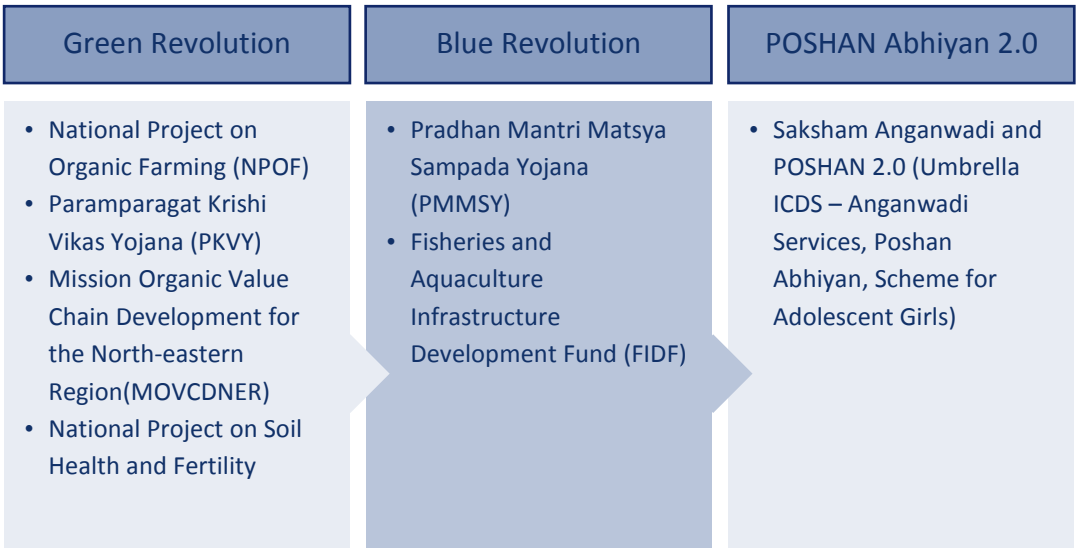
The government has been taking various initiatives in the form of pivotal centrally sponsored schemes to promote SFS. For example, schemes such as the Green Revolution, Blue Revolution, and *POSHAN Abhiyaan* are the major umbrella schemes launched under different ministries of the central government as shown in Figure 2.3.

Union Budget Announcements 2023-24

- **A Policy on Promotion of Organic Fertilisers** was announced in the Union budget 2023-24 as a central sector scheme to promote the use of organic fertilisers by providing market development assistance (MDA) and by establishing 500 new 'waste to wealth' plants under the **GOBARdhan** (Galvanising Organic Bio-Agro Resources dhan) scheme.
- Government has announced the **"PM Programme for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth" (PM-*PRANAM*)** in budget 2023-24 to incentivise states and UTs to promote the use of alternative fertilisers and the balanced use of chemical fertilisers.

Source: *https://www.downtoearth.org.in/agriculture/union-budget-2023-24-india-s-farmers-can-take-to-organic-agriculture-with-proper-support-87485 ; https://pib.gov.in/PressReleasePage.aspx?PRID=1911559#:~:text=Government%20has%20announced%20%E2%80%9CPM%20Programme,balanced%20use%20of%20chemical%20fertilizers.*
(last accessed on July 26, 2024)

Figure 2.3: The Missions/Projects/Schemes under CSS Umbrella Schemes to Promote SFS



Source: Compiled from the Economic Survey 2024 and the Union Budget Schemes (Available at: https://www.indiabudget.gov.in/; https://www.indiabudget.gov.in/economicsurvey/index.php (last accessed on July 25, 2024)

The Green Revolution under the MoAFW includes some major schemes and initiatives that complement various state-level initiatives for organic agriculture and soil health management for sustainability. The government has been promoting natural farming since FY 2019-2020 through a sub-scheme namely *Bharatiya Prakritik Krishi Paddhati* (BPKP) under the

Paramparagat Krishi Vikas Yojana (PKVY), launched in 2015; it formulated the National Mission on Natural Farming (NMNF) in FY 2023-24 as a separate and independent scheme by upscaling BPKP (MoAFW, 2024).[60] Organic farming models under the PKVY scheme like natural farming, *vedic* farming, zero budget natural farming (ZBNF), etc., were included in 2018 to eliminate chemical pesticides and promote good agronomic practices.[61] The participatory guarantee system (PGS) is also gaining popularity[62] among organic farmers.

In the fishery sector, a flagship scheme named the *Pradhan Mantri Matsya Sampada Yojana* (PMMSY) under the MoFAHD was launched in FY 2020-21 for focused and sustainable development of the fisheries sector in the country under the Blue Revolution scheme to address critical gaps in fish production and productivity, strengthen the value chain, ensure traceability and establish a robust fisheries management framework and promote fishers' welfare.[63] The Fisheries and Aquaculture Infrastructure Development Fund (FIDF) was launched in FY 2018-19 to create marine aquaculture infrastructure and modernise inland fisheries infrastructure.[64]

The government launched the *POSHAN Abhiyaan* (Prime Minister's Overarching Scheme for Holistic Nutrition) under MoWCD on March 8, 2018, to address the problem of malnutrition in the country. The goals of *POSHAN Abhiyaan* are to achieve improvement in the nutritional status of children between the ages of 0 and 6, adolescent girls, pregnant women and lactating mothers in a time-bound manner.[65] The *Pradhan Mantri Poshan Shakti Nirman* (PM *POSHAN*), earlier known as the mid-day meal scheme to provide one hot cooked meal in government and government-aided schools, was approved by the government under the Ministry of Education for the period 2021-22 to 2025-26.[66]

To ensure animal welfare, CSSs like the Centrally Sponsored Fodder and Feed Development Scheme, 1987, has been implemented in all states; it supplements the efforts of states toward building an SFS.[67]

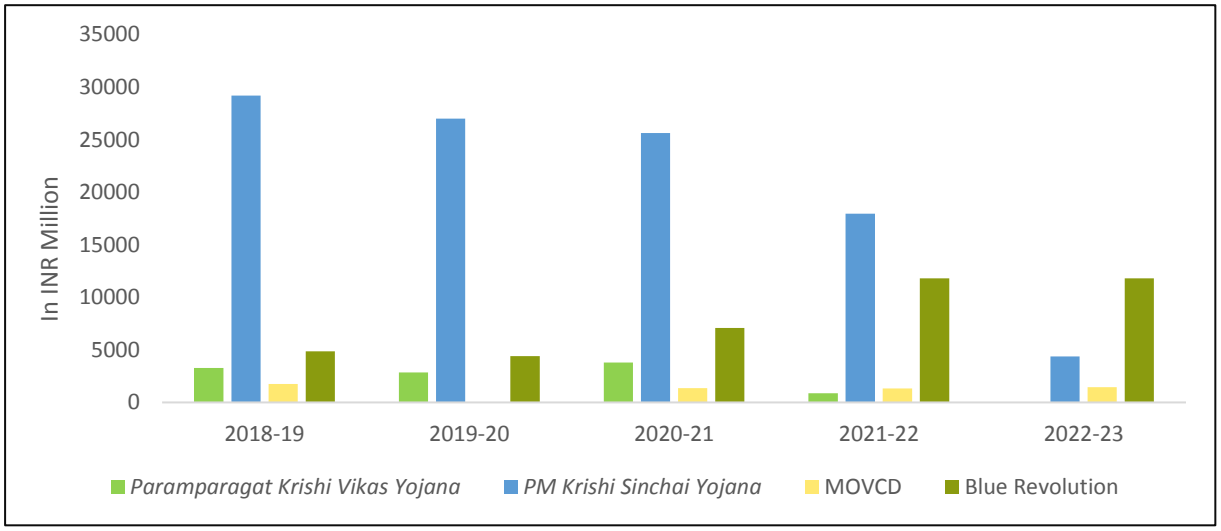
2.3.1 Budgetary Allocations and Impact Analysis: Central Government Schemes

Achieving the sustainability mission and effectively advancing SFS requires focus on the efficient allocation of funds to the schemes initiated to promote sustainable growth. Historically, budgetary allocations for these initiatives have fluctuated significantly. While budgetary allocations have been increased for some schemes, there has either been a reduction in the case of others or there have been reallocations to these schemes under

[60] https://pib.gov.in/PressReleasePage.aspx?PRID=2003179 (last accessed on August 3, 2024)
[61] https://www.indiabudget.gov.in/budget2019-20/economicsurvey/doc/vol2chapter/echap07_vol2.pdf (last accessed on July 20. 2024)
[62] https://www.ifoam.bio/our-work/how/standards-certification/participatory-guarantee-systems (last accessed on July 25, 2024)
[63] https://pib.gov.in/PressReleasePage.aspx?PRID=1652573 (last accessed on July 25, 2024)
[64] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1777708 (last accessed on July 30, 2024)
[65] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1812421 (last accessed on July 25, 2024)
[66] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1812421 (last accessed on August 3, 2024)
[67] https://www.nddb.coop/sites/default/files/pdfs/Fodder-Feed.pdf (last accessed on June 18, 2024)

different categories. For example, there was reduction in the budgetary allocations for the PM *Krishi Sinchai Yojana* from FY 2018-19 to FY 2022-23, while allocations were increased for schemes such as the Blue Revolution during the same period. Some of the old schemes have also been revamped and brought under new schemes. For example, a new scheme called the *Pradhan Mantri Matsya Sampada Yojana*[68] was launched under the Blue Revolution Umbrella scheme in 2020, whereas the Integrated Development and Management of Fisheries scheme was discontinued in the 2022 Union Budget. Trends in actual budget allocations for these schemes from 2018-19 to 2022-23 are illustrated in Figure 2.4.

Figure 2.4: Central Government Schemes Budget Outlay for FY 2018-19 to FY 2022-23



Source: Compiled and Extracted from Union Budget actual allocations under various Ministries and Departments from 2020-21 to 2024-25

The impact analysis of some of the schemes is discussed in Table 2.1. However, all the schemes and their related impacts have not been considered since some schemes; for instance, Mission Organic Value Chain Development for the north-east region has now been incorporated under a new centrally sponsored scheme named *Krishionnati Yojana,*[69] which was earlier a part of the "Green Revolution", while sub-schemes like the *Paramparagat Krishi Vikas Yojana* (PKVY), and Rain-fed Area Development (RAD) have been incorporated under the *Rashtriya Krishi Vikas Yojana*[70] and received no budget allocation in the 2024 Union Budget. Moreover, some schemes like the PM-*Kisan Samman Nidhi Yojana*[71] and the PM *Kisan Sampada Yojana*[72] have only benefitted farmers in general and have had any significant impact on agriculture or SFS.

[68] https://pib.gov.in/PressReleasePage.aspx?PRID=1986155 (last accessed on July 26, 2024)
[69] https://midh.gov.in/PDF/Administrative%20Approval%202021-22.pdf (last accessed on July 26, 2024)
[70] https://pib.gov.in/PressReleasePage.aspx?PRID=2003189 (last accessed on August 3, 2024)
[71] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1946816 (last accessed on July 26, 2024)
[72] https://pib.gov.in/PressReleasePage.aspx?PRID=2004517#:~:text=Pradhan%20Mantri%20Kisan%20Samman%20Nidhi,as%20well%20as%20domestic%20needs; https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2004229 (last accessed on July 26, 2024)

Table 2.1: Budget Outlays and Impact of Some Central Government Schemes

Schemes/Policies/Initiatives	Cost/Expenditure	Impact
Paramparagat Krishi Vikas Yojana **(Organic Farming Scheme under the Green Revolution)**	• Since 2023, farmers of various states are being given funding of INR 50000/ha for 3 years.	Since 2015-16, an area of 1.185 million ha has been brought under organic farming through the PKVY scheme; the government intends to bring in another 0.600 million ha under organic farming between 2022-23 and 2025-26.
Agriculture Infrastructure Fund (AIF)	• INR 1 trillion, disbursed from FY 2020-21 to FY 2025-26.	INR 332.09 million has been sanctioned for 44,912 projects under AIF, which have mobilised an investment of INR 564.71 million in the agriculture sector in 2023.
Pradhan Mantri Krishi Sinchai Yojana	• Between FY 2021-22 and FY 2025-26, an overall outlay of INR 930.68 billion has been approved by the government.	The area covered under micro irrigation between 2016-17 and 2021-22 was 6172.18 thousand hectares while the area brought under protective irrigation in the same period was 1,207.46 thousand hectares.
Pradhan Mantri Matsya Sampada Yojana **(Blue Revolution)**	• A total outlay of INR 200.5 billion PMMSY was made in the fisheries sector in India.	India is now the third-largest fish-producing country in the world, contributing 8 per cent to global fish production with the production having increased to a record of 16.24 MT (FY 2021-22)
Fisheries and Aquaculture Infrastructure Development Fund (FIDF)	• The government has provided funding of INR 75.22 billion up to 2025-26 and budgetary support of INR 9394.8 million.	FIDF created safe landing and berthing facilities for more than 8100 fishing vessels.
POSHAN Abhiyaan **2.0**	• A total of INR 198.76 billion was the actual budget allocated for FY 2022 -23.	As per the National Family Health Survey (NFHS), children under 5 years who are underweight fell from 35.8 per cent (NFHS-4) to 32.1 per cent (NFHS-5)

Extracted and compiled from multiple sources: The Economic Survey 2023-24, Union Budget 2024; https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1910415#:~:text=India%20is%20the%20third%20largest,12.12%20Million%20Tonnes%20from%20Aquaculture; https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1897354; https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1910076; https://pib.gov.in/PressNoteDetails.aspx?NoteId=151969&ModuleId=3#:~:text=PM%20POSHAN%20(POshan%20SHAkti%20Nirman,school%20attendance%20among%20disadvantaged%20students.; https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1906900; https://pib.gov.in/PressReleasePage.aspx?PRID=2002012; https://www.internationaljournalofresearch.org/2024/02/fisheries-and-aquaculture.html (last accessed on July 26, 2024)

2.4 State Government Policies for Supporting SFS

Some states have specific regulations/policies/guidelines relating to areas like animal health and welfare, organic farming, and measures to reduce pesticide and insecticide use and greenhouse gas emissions as part of the measures taken to develop SFS.

The MoAFW launched the scheme 'Mission Organic Value Chain Development (MOVCD) for the north-east region launched in FY 2015-16, a CSS that was implemented in eight north-eastern states[73] to develop certified organic production in a value chain to connect growers with consumers and support the development of the entire value chain.[74] Various states, including Karnataka, Rajasthan and Kerala, have their organic farming policies, and there is significant variation in the share of organic cultivation across these states (see Figure 2.5). However, the budget allocations for supporting these policy initiatives by the state governments are not readily available or accessible. For example, Karnataka was one of the first states in the country to introduce a policy on organic farming, way back in 2004. In 2017, the state policy was revised to bring 10 per cent of the 1217 million hectares under organic cultivation but no data on the funds allocated for this purpose are available.[75] Sikkim, in 2010, had also implemented policies and actions to promote organic farming even before the central government introduced such initiatives. It is also the only state in the world to completely shift to organic farming by eliminating the use of chemical fertilisers and pesticides.[76]

Figure 2.5: Examples of State Organic Farming Policy

State Policies	
Arunachal Pradesh	• Organic Farming Policy, 2014
Gujarat	• State Policy on Organic Farming, 2015
Kerala	• State Organic Farming Policy, Strategy and Action Plan, 2007
Karnataka	• State Policy on Organic Farming, 2004 (revised 2017)
Mizoram	• Organic Farming 2004
Rajasthan	• Organic Farming Policy, 2017
Sikkim	• State Policy on Organic Farming, 2010

Source: Compiled by Khurana and Kumar (2020)

[73] Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura

[74] https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1697160 (last accessed on December 13, 2022)

[75] https://www.deccanherald.com/india/karnatakas-organic-farming-journey-robust-policies-slowed-down-by-poor-implementation-918481.html (last accessed on August 4, 2024)

[76] https://panorama.solutions/en/solution/sikkims-state-policy-organic-farming-and-sikkim-organic-mission-india (last accessed on August 4, 2024)

Some states also have state policies for animal health standards and welfare. For example, the Tripura government launched a newly revamped scheme called *Mukhyamantri Prani Sampad Bikash Yojana*, on November 10, 2023, with an outlay of INR 100 million, for the overall development of the animal husbandry sector in the state. During FY 2022-23, some 5,644 piggery, 2,882 goat farms, 19,808 poultry farms and 6,710 duck farm units were distributed in the state.[77]

Many states have also launched schemes and policies to promote healthy lifestyles and diets in alignment with the central government's *POSHAN Abhiyan* Scheme. For example, the Government of Chhattisgarh launched the *Mukhyamantri Suposhan Abhiyan* in October 2019 with a budgetary allocation of INR 600 million in the state to provide nutritious food to villagers at the panchayat level.[78] According to the National Family Health Survey-5 (FY 2019-21), the percentage of malnutrition in the state is 31.3 per cent,[79] which is less than the national average of 32.1 per cent.[80]

Similarly, Mission *Sampurna Poshan* was launched by the Telangana government in 2020 to enable the local production and consumption of millets to address the challenges of nutritional deficiency. Although the budget allocation for this policy is not readily available, it has been noted that 80 per cent of the beneficiaries were consuming millets in 2022.[81]

It is evident that certain state government policies have not only effectively promoted SFS within the country but have also set a benchmark for other states to implement these policies; they have also been more successful than the central government. However, budget allocations and the impact of many state policies remain unclear.

2.5 Examples of Multi-stakeholders MoUs/Partnerships/Collaborations in SFS

Central government ministries, departments and agencies collaborate with each other, state governments, international organisations and the private sector on various SFS projects. Examples of MoUs and partnerships by the central government include MoAFW's partnership with CropLife India[82] to launch the Grow Safe Food Campaign in 2014 that aimed to promote good agricultural practices (GAP) and integrated pest management (IPM). This collaboration focuses on the responsible use of crop protection products and ensures the availability of high-quality crop protection solutions.[83]

Similarly, states have also entered into collaborations and partnerships with other agencies, such as international organisations, foreign and/or domestic governments, and private

[77] https://finance.tripura.gov.in/sites/default/files/Budget%20Speech%20English_0.pdf (last accessed on July 18, 2024)
[78] https://cmchhattisgarh.cgstate.gov.in/Suposhan-Abhiyaan (last accessed on December 13, 2022)
[79] https://pib.gov.in/PressReleasePage.aspx?PRID=1806601 (last accessed on August 4, 2024)
[80] https://main.mohfw.gov.in/sites/default/files/NFHS-5_Phase-II_0.pdf (last accessed on August 4, 2024)
[81] https://static.pib.gov.in/WriteReadData/specificdocs/documents/2022/sep/doc2022925109101.pdf (last accessed on August 4, 2024)
[82] https://croplifeindia.org/projects/grow-safe-food-campaign/#:~:text=The%20Grow%20Safe%20Food%20campaign,launched%20the%20'Grow%20Safe%20Food'(last accessed on August 4, 2024)
[83] https://croplifeindia.org/projects/grow-safe-food-campaign/ (last accessed on August 4, 2024)

organisations, which cover various aspects of SFS. Some examples of the collaborations by different state governments with international organisations include the Government of Chhattisgarh's the Chhattisgarh Inclusive Rural and Accelerated Agriculture Growth (CHIRAAG) Project with the aid of the World Bank.[84] An example of inter-state collaboration is the MoU signed between the Governments of Sikkim's state organic certification agency (SOCCA) and Ladakh to make Ladakh a certified organic union territory (UT) by 2025.

States have also partnered with NGOs and private entities. For instance, the Madhya Pradesh Department of Farmers' Welfare and Agriculture Development and National Coalition for Natural Farming (NCNF) signed an MoU to increase farmers' incomes by increasing the area under natural farming.[85] Under this initiative, about 99,000 hectares of land has been brought under natural farming in Madhya Pradesh.[86]

Among international organisations, the FAO is working in India on areas such as sustainable and improved agricultural productivity and increased farm incomes, and stronger food and nutrition security systems. The National Institution for Transforming India (NITI Aayog), the MoA&FW, and FAO have jointly launched the 'Investment Forum for Advancing Climate Resilient Agri-food Systems in India' in 2024.[87] This initiative aims to develop an investment and partnership strategy to advance climate resilient agri-food systems among the government, private sectors and farmers' organisations, and financial institutions in India.[88]

FAO has provided technical assistance and training to master trainers under the Fostering Climate Resilient Upland Farming Systems in the Northeast (FOCUS)[89] project of the International Fund for Agricultural Development (IFAD) in the states of Mizoram and Nagaland, which focuses on productive and sustainable "*jhum"* cultivation practices to create ecological balance.[90]

2.6 Cross-Border Collaboration/Partnerships in SFS

At present, while there are examples of cross-border collaborations and partnerships, commitments through trade agreements are limited. There are limited examples of cross-border regulatory co-operation through mutual recognition agreements (MRAs). These agreements help to facilitate cross-border trade by establishing a system of recognition of inspection testing and certification. The recent MRA for organic products that was implemented between India and Taiwan in July 2024 is one such example; the agreement permits agricultural products that are certified organic under India's National Programme for

[84] https://projects.worldbank.org/en/projects-operations/project-detail/P170645 (last accessed on December 13, 2022)
[85] https://www.freepressjournal.in/bhopal/bhopal-mou-signed-to-promote-natural-farming-in-mp (last accessed on December 13, 2022)
[86] https://agriexchange.apeda.gov.in/news/NewsSearch.aspx?newsid=50865 (last accessed on July 29, 2024)
[87] https://www.fao.org/india/news/detail-events/en/c/1675911/ (last accessed on July 30, 2024)
[88] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1999134 (last accessed on July 30, 2024)
[89] https://webtest.nagaland.gov.in/focus/wp-content/uploads/2018/03/1.IFAD-FOCUS-Nagaland-Main-Report.pdf and https://www.ifad.org/en/web/operations/-/project/2000001421 (last accessed on December 2, 2022)
[90] https://www.fao.org/india/news/detail-events/ru/c/1270224/ (last accessed on December 2, 2022)

Organic Production (NPOP) and accompanied by a valid organic certification document issued by an accredited body to be sold in Taiwan as organic produce.[91]

India has also autonomously liberalised different segments of SFS, especially agriculture, for foreign investment so that it can bring in technology and best practices. However, there are restrictions on FDI across the food supply chain, especially in retail and e-commerce. Some states have allowed direct procurement by the private sector while others have not allowed it. Thus, there are issues with uniformity in domestic policy, which is a concern for the country as it negotiates trade agreements. On the whole, India has been defensive in opening up the agri-food sector under its trade agreements, which are protected through high tariffs. This trend, however, is changing as India is signing trade agreements with countries like Australia and the United Kingdom and regions like the EU, which have specific asks for liberalising tariffs in certain food products.

2.7 Key Takeaways from the Policy Analysis

The discussions in this section highlights that India has already initiated several policy measures and schemes towards SFS but these are not in a consolidated format driven by an overall strategy and roadmap, holistically covering all segments of the SFS supply chain. Despite India being a food surplus nation and its dedicated efforts to address food and nutritional security, several challenges persist. Several government departments/agencies are involved at the centre and in states, covering different aspects of SFS. Various policies/schemes have been launched over the years, prioritising different aspects of SFS, such as declaring 2023 the International Year of Millets; however, budgetary allocations for such initiatives are suddenly withdrawn and the overall budget for SFS remains low as compared to those dedicated towards other areas such as chemical fertilisers. There are variations in the implementation of good agriculture practices (GAP). Further, the impact analysis and learnings from the schemes are limited. Some of these issues are discussed in the next section.

3. Gaps and Issues in India's Sustainable Food System

While Section 2 underscores India's commitment to achieving SFS through various policies/initiatives and schemes at the centre and in states, it also reveals several issues ranging from the lack of a vision document or a roadmap that provides clear guidance on how to develop a sustainable food system in India to the existence of multiple regulatory bodies enforcing regulations in a piecemeal manner, the lack of proper budgetary allocations linked to sustainability and the lack of supply chain traceability, to name a few. Some of the issues are discussed below.

[91] https://pib.gov.in/PressReleasePage.aspx?PRID=2032060#:~:text=Mutual%20Recognition%20Agreement%20between%20India%20and%20Taiwan%20for%20Organic%20Products&text=The%20Mutual%20Recognition%20Agreement%20(MRA,with%20Taiwan%20at%20New%20Delhi. (last accessed on July 25, 2024)

3.1 Lack of a Vision Document or Road Map for SFS

The lack of a vision document or a roadmap for sustainable food systems (SFS) has resulted in piecemeal policies by multiple government bodies without targets and budget allocation. No government document covers the entire sustainable food system from farm-to-fork. For example, although the Economic Survey 2024 has covered sustainable agriculture, it does not provide a comprehensive, integrated strategy for SFS as a whole. One reason for this is that agriculture experts do not work with food experts and nutritionists. Due to the lack of an integrated policy approach, efforts made towards achieving sustainability in food systems have not been effective or efficient.

3.2 Gaps in Co-ordination across Multiple Government Agencies at the Centre and between Centre and States

In India, with a quasi-federal governance structure, both the centre and states can have policies on SFS that differ from each other. From the opposition to reforms, like the three farm bills [Essential Commodities (Amendment) Bill, 2020, Farmer's Produce Trade and Commerce (Promotion and Facilitation) Bill, 2020, and Farmers' (Empowerment and Protection) Agreement of Price Assurance and Farm Services Bill, 2020], of the Centre by states like Punjab and the full implementation of these reforms by states like Bihar, to allowing foreign direct investment in retail, there are several instances of lack of co-ordination across different agencies at the centre and between the states and the centre. There are significant variations across states in implementing central level policies and much of the opposition to good policies are related to which political party is in power in a state rather than the policy itself (Mukherjee et al., 2022).

Sometimes more than one ministry/department at the centre can be responsible for governance and policies/regulations which leads to confusion and lack of co-ordination. For example, in the case of spices, the responsibilities are divided among APEDA, the Spices Board and the Export Inspection Council, leading to potential overlap and inconsistencies. A similar issue arises with organic farming with the National Centre for Organic and Natural Farming (NCONF) under the Department of Agriculture and Farmers' Welfare (MoAFW) handling domestic market policies, APEDA under the MoCI overseeing exports, and the FSSAI managing policies for both the domestic market and imports. India has allowed both the participatory guarantee system (PGS), or self-certification of organic products, and third-party certification, but self-certification has subsidies while third-party certification is costly. Further, PGS is not accepted in key developed country markets. The division in policymaking negatively impacts the selection of programmes for budget allocation, which affects the farmers' ability to grow, export and increase their income.

Further complications arise due to differing ideologies and agendas across various ministries/departments at the centre. For instance, the Green Revolution initiative under the MoAFW promotes sustainability in agriculture through organic and natural farming techniques, which has a low budget allocation. In contrast, the Ministry of Chemicals and Fertilisers endorses substantial subsidies for urea-based fertilisers, and receives a high budget allocation.

3.3 Lack of a Nodal Agency

Exports are regulated by multiple export promotion councils and, if there is an issue, like the recent ban on certain mixed spices by Singapore, there is no single agency to look into and resolve it. There are three logos for organic – the National Programme for Organic Production (NPOP) logo, facilitated by APEDA, MoCI, the PGS logo under the National Centre of Organic Farming (NCOF),[92] MoAFW, and the FSSAI's '*Jaivik Bharat*'.[93] *Jaivik Bharat* aims to authenticate organic food items domestically; it also recognises third-party certification, self-certification and other certifications as well. Further, while the FSSAI acknowledges third-party certification, it has not provided a list of approved laboratories and certification bodies for imports, leading to a ban on organic product imports by FSSAI. Notably, the third-party certification bodies and laboratories for organic certification fall under APEDA's jurisdiction and there is no well laid out mechanism or guiding document for the smooth transition of farmers from the PGS to third-party certification.

3.4 Policy, Definition and Regulatory Gaps

India does not have an overarching government procurement policy document that focuses on nutritious food. While people in the country suffer from various micronutrient deficiency-related diseases, policies are still evolving in areas like FOPNL. There is no formal definition of terms like food fraud, allowing companies to avoid accountability. The term 'food fraud' may refer to the intentional mislabelling of a product or misleading claims to make profits. As per the FSSAI findings (2018-19), 106,459 food samples were analysed that showed 3.7 per cent were unsafe, 15.8 per cent were substandard, and 9 per cent had labelling defects.[94] Moreover, lack of clarity in product definitions may contribute to misleading advertising. In 2023, FSSAI's Advertisement Monitoring Committee flagged 32 new cases of food business operators (FBOs) making misleading claims.[95]

Certain areas within SFS, such as food waste, animal food and feed, and fodder development currently have significant policy gaps. Food waste management in India is becoming a critical problem due to an increase in the population. Some studies show that Indians waste a significant amount of food, as much as the whole of the UK consumes.[96] Yet, India lacks proper food waste management regulations, unlike countries like the UK.

[92] https://pgsindia-ncof.gov.in/uploads/docs/165450975644172021534370rganic_Food_and_Certification.pdf (last accessed on August 13, 2024)
[93] https://jaivikbharat.fssai.gov.in/ (last accessed on June 13, 2024)
[94] https://hospitality.economictimes.indiatimes.com/news/speaking-heads/food-fraud-contaminating-indian-food-ecosystem/103804813#:~:text=In%20the%20situation%20in%20India,percent%20samples%20had%20labelling%20defects. (last accessed on June 13, 2024)
[95] https://www.thehindu.com/news/national/explained-misleading-food-ads-and-regulations-to-curtail-them/article66815388.ece (last accessed on June 13, 2024)
[96] https://www.avristech.com/food-waste-management-in-india/ (last accessed on July 30, 2024)

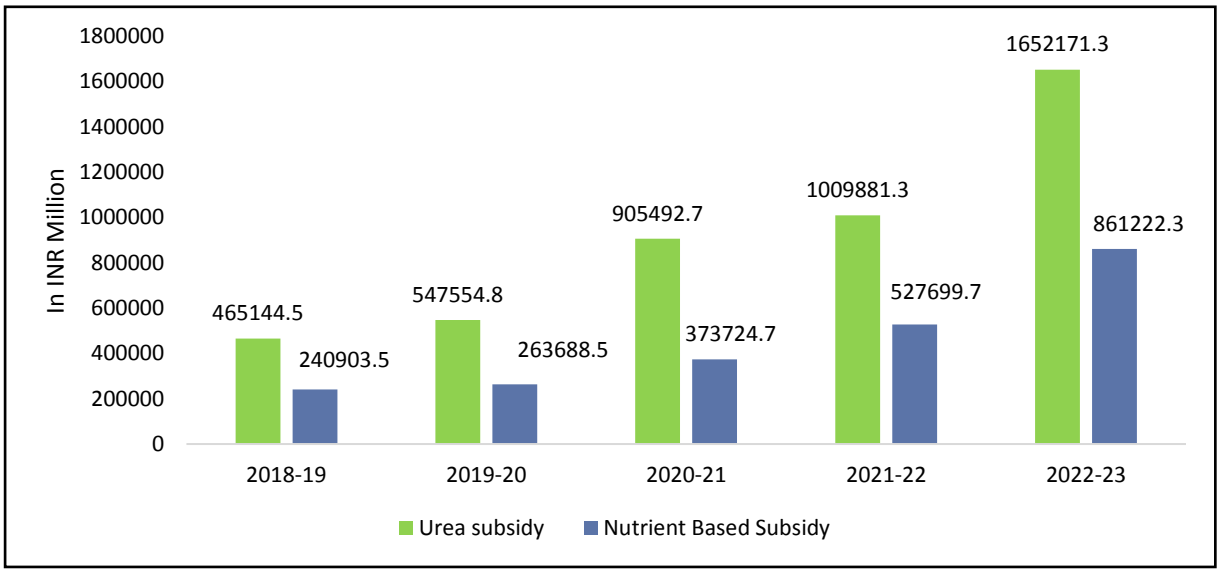
3.5 Lack of Data and Information on Policies/Schemes

There is a huge gap in information and data on policies and schemes, especially on their impact. The problem is compounded at the state level, which makes it very difficult to make interstate comparisons. There is hardly any data to compare states by budget allocations and expenditure, making it challenging for policymakers at the centre to analyse the effectiveness and impact of policies and to make informed recommendations. Similarly, central government schemes often lack transparency and detailed information; for example, some discontinued schemes may not be reflected in the Union Budget, leaving their outcomes, successes, or failures, and whether targets were met, unknown. Similarly, there is no data on goods and services tax collection by food sub-categories, which can help show trends in consumption. This lack of clarity impedes comprehensive evaluation and undermines accountability targets.

3.6 Insufficient/no budget allocation for certain components of SFS and no nutrition-linked taxes and subsidies

One key issue in monitoring SFS is insufficient budget allocation. Stakeholder consultations reveal, overall, low nutrition-based subsidy and lack of uniformity in subsidy distribution across states. With increasing subsidy on chemical fertilisers and a weak research base for organic and bio-fertilisers, sustainable agriculture might remain a vague vision in India. Urea dominates the fertiliser market in terms of subsidy spending and the budget for organic and nutrient-based fertilisers is very small (see Figure 3.1).

Figure 3.1: The Budget Outlay Comparison between Urea Subsidy and Nutrient Based Subsidy



Source: Compiled and Extracted from Union Budget (2018-19 to 2022-23) Department of Fertilisers under the Ministry of Chemicals and Fertilisers

Moreover, there are no schemes or benefits for third-party organic certification, and often schemes do not take into account factors such as the cost of production and returns to farming, rendering them ineffective in promoting the cultivation of healthy food. The goal of establishing India as a global hub for millets did not see a rise in production (which increased marginally by one per cent) because the minimum support price (MSP) for *Shree Anna*, that includes *jowar, bajra, ragi*, and other millets, rose only marginally between 2022-23 and 2023-24. Specifically, the MSP for *jowar* increased by just INR210 per quintal, while for *bajra* it was only INR150 per quintal. In contrast, the MSP for sesamum was raised significantly by INR805 per quintal during the same period.[97] The MSP guides farmers in choosing crops to grow since price security is a major factor that influences a farmer's decision to grow a particular crop.

Nutritious food is expensive. According to FAO 2024, the cost of a healthy diet (PPP dollar per person per day) in India was estimated at US$ 3.36 in 2022,[98] which makes it unaffordable for most people. Moreover, there is no policy/scheme to reduce the cost of nutritious food and promote diets that ensure nutrition and/or addresses micro-nutrient deficiencies. Budgets may be allocated for an initiative and suddenly stopped as happened in the case of millets. Thus, good schemes for SFS can be suddenly withdrawn, when there is a need to replicate them. Product reformulation to nutritious products is costly and most incentives and subsidies are not linked to nutrition. The GST is not linked to nutrition.

3.7 Lack of Infrastructure and Access to Quality Inputs

There are gaps in infrastructure and quality inputs. Studies have revealed that infrastructure such as cold storage is not equally spread across all states and there is a severe shortage of pack houses, which can lead to product spoilage/food wastage [Goyal et al. (2017); Jha et al., (2019); Shekhar et al. (2023)]. The uneven distribution of cold storage infrastructure in India exacerbates regional disparities and increases the risk of export rejections, especially for organic products with short shelf lives. While there are infrastructure gaps, in the recent Union Budget 2024, the capital outlay under the Ministry of Food Processing Industries on food storage and warehousing decreased from INR 7 million in FY 2023-24 to INR 5.4 million in FY 2024-25 (according to Union Budget 2024).[99]

There is a severe shortage of quality inputs, which increases their price. Spurious inputs and banned fertilisers are often sold to farmers at low prices. An ongoing Pan-India survey by the authors found that poor quality inputs (seeds, fertilisers, pesticides) has led to a decline in curcumin content of turmeric and lowered the quality of produce. In animal husbandry, obtaining vaccines is crucial but difficult in remote areas like Assam, where vaccines must be sourced from distant states like Karnataka, increasing transportation costs and access gaps, and posing recurring financial risks for small farmers, resulting in diminished cattle health (Mukherjee et al., 2017). Many districts in the northeast and remote regions suffer from a shortage of community-level hygienic slaughterhouses, leading to weak linkages between

[97] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2003184 (last accessed on July 26, 2024)
[98] Data generated from https://www.fao.org/faostat/en/#data/CAHD (last accessed on August 13, 2024)
[99] https://www.indiabudget.gov.in/doc/eb/sbe45.pdf (last accessed on July 24, 2024)

slaughterhouses, markets and waste disposal systems. Veterinary care facilities are limited in remote areas, such as parts of the north-eastern states like Assam (Mukherjee & Barah 2020).

3.8 Shortage of Skilled Manpower and Training Gaps

There is a lack of manpower and capacity across various sectors of SFS such as quality veterinary doctors or trainers for organic certification. There are shortages of agriculture extension workers. There are notable gaps in identifying skill requirements for different sectors and crops due to a standardised, one-size-fits-all approach in training programmes, which fails to customise programmes based on sector, export demands, or specific farmer needs. Training deficiencies also persist in critical areas such as disease mitigation for livestock, food processing techniques and maintaining food safety standards. These training gaps lead to a lack of quality manpower and lack of knowledge of good agriculture practices, which further exacerbate inefficiencies and challenges within the SFS [Rohit et al. (2020); Mukherjee et al. (2020)].

3.9 Difficulties in Supply Chain Traceability and Gaps in Use of Technology

The core issue in establishing supply chain traceability is the fragmented supply chain where a supplier has to source from multiple small and medium farmers, and products are often sourced from the agriculture markets/*mandis* rather than directly from the farmers. While APEDA has established supply chain traceability for certain products for exports like grapes, FSSAI, which is responsible for the domestic market, has not yet implemented technology-based supply chain traceability. The difficulty arises as farmers are not under the scope of FSSAI, and hence, cannot be regulated (Mehdi et al., 2019). The fragmented supply chain in agriculture often leads to inefficiencies and increased costs, exacerbated by the small size of farms and the overwhelming number of farmers (Negi & Anand, 2015). Farmers have limited access to modern equipment and training to improve their operations.[100] Additionally, government officials, such as those in state horticulture departments, require tools like tablets for effective farm inspections. The lack of robust public-private partnerships on farm for technology transfer hinders progress, despite the strong capabilities of the Indian private sector in technology, which could otherwise drive significant improvements in this sector.

Establishing traceability is hindered by not only lack of access to technology but also its costs and training on how to use it. While many farmers have smartphones, they often do not use them to connect to resources or markets. The government is trying to unify stakeholders like FPOs, transporters, and processors, but there is a need to develop integrated and efficient online platforms like *Kisan Suvidha*[101,102] to help farmers directly access markets (Mukherjee et al., 2020).

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100 https://kisanvedika.bighaat.com/news-updates/11-major-problems-faced-by-indian-farmers-in-agriculture-in-2023/ (last accessed on August 7, 2024)

101 *Kisan Suvidha* is a smart app for farmers, an initiative by the National Informatics Centre. All services/information relevant to farmers are linked to a common platform. For more details see https://kisansuvidha.gov.in/ (last accessed on June 13,2024)

102 https://pib.gov.in/PressReleseDetail.aspx?PRID=1606306 (last accessed on June 13, 2024)

3.10 Lack of Implementation of GAP

The implementation of good agricultural practices (GAP) in India faces several significant challenges such as lack of awareness and training among farmers, financial constraints and limited access to quality inputs that hinder the country's ability to meet international standards and boost agricultural exports. Additionally, there is insufficient policy support and fragmented research and development efforts. Agricultural universities often lack updated curricula on GAP and there is a shortage of extension services to assist farmers in applying these practices.

3.11 State-specific Issues

There exist variations in SFS state policies and practices; for example, only a few states have policies regarding animal feed. There is also variation in accepting and implementing central government policies across states as in the case of the APMC Act or the recent farm bills. In some states, there may be infrastructure gaps or gaps in policy implementation. For example, under the PGS-India initiative, regional councils play an important role but are unevenly distributed across states. The enforcement and control of SFS is under the state governments, and the KIIs, conducted by the authors, revealed the prevalence of spurious products and fraud and corruption in the self-certification system. The PGS-India logo ensures a level of quality and trust in its products, but incidence of fraudulent practices have adversely affected the trust in the certification system; this is also true for the third-party certification process. As a result, many partner countries have withdrawn their unilateral certifications for Indian exporters. Many states do not monitor schemes and policy outcomes, which makes it difficult to identify the issues. There is hardly any data on state schemes, their implementation and impact, which can help to identify and replicate best practices.

3.12 Trade-related issues

Despite being one of the leading exporters of agri-food and organic products, India has not adequately focused on promoting exports and enhancing trade. The issues concerning SFS in the context of trade are the following:

i. **Sporadic bans or export duties:** Sporadic ban on exports whenever domestic production is low and/or prices are likely to rise have made India an unreliable supplier. The export ban leads to global shortages and/or price increases. For instance, in 2023, India banned the export of non-basmati white rice to prioritise domestic consumers because of depleting public stocks.[103] In the same year, India imposed a 40 per cent duty on the export of onions to improve the supply of the staple vegetable in the domestic market.[104]

[103] https://www.downtoearth.org.in/governance/export-bans-restrictions-how-government-is-trying-to-keep-food-prices-in-check-ahead-of-elections-95532 (last accessed on August 8, 2024)

[104] https://economictimes.indiatimes.com/news/economy/agriculture/onion-exports-india-lifts-ban-on-sending-onions-out-of-the-country/articleshow/109832208.cms?from=mdr (last accessed on August 9,2024)

ii. **Rejection of exports in key markets for not adhering to SPS standards**. Indian exports face rejections in key markets like the EU, Japan, Singapore and the USA due to non-adherence to the importing country's food safety standards. According to Global Trade Research Initiative (GTRI) 2024,[105] India's spice exports are at risk with nearly US$ 700 million threatened by regulatory actions in various countries, putting the industry's future in jeopardy.

iii. **Lack of a single nodal agency for exports quality control:** A core issue related to trade is the lack of a single nodal agency for export quality control, which leads to many issues. First, exporters have to work with multiple agencies and their laboratories; second there is no nodal agency to represent India in bilateral equivalence agreements, and third, no single agency can be held accountable if there is an export issue. Multiple agencies with overlapping regulations increase compliance costs, but there is hardly any accountability. This is a major problem for products like organic crops where the lack of a single nodal agency makes it difficult to sign mutual recognition agreements.

iv. **Limited discussions and collaborations on SFS through trade agreements:** While India is a large exporter of food products, it takes a defensive position on trade agreements, which make it difficult to become a global food processing hub. First, high import duties even on raw materials and intermediate products and a ban on the import of organic products inhibits the growth of the food processing sector for exports. Second, there is no structured process for signing mutual recognition agreements and regular policy dialogues. Third, there are limited examples of multi-stakeholder partnerships and learning from global best practices. In SFS, India can be a global and regional leader, taking forward some regional initiatives like that of Bhutan for organic products and creating platforms for greater collaborations, both within the region and across countries.

v. **Lack of product specific export strategy and data:** While India is one of the largest producers and exporter of organic products, the country is yet to come up with an HS code for organic products, unlike the USA or Canada. This makes it difficult to identify and map organic food products exports and imports.

4 Recommendations and Way Forward

Despite the growing emphasis by the centre and state governments on transitioning to a sustainable food system in India, significant gaps and challenges remain, as outlined in Section 3. To advance towards a sustainable food system, India must address these challenges, examine its policies and policy gaps, align policies with the United Nations Sustainable Development Goals (UNSDGs) and replicate success stories to boost the global competitiveness of India's agri-food sector. There are many good policies and examples of success stories in India, ranging from production and exports of third-party certified organic products to the establishment of a traceability system by APEDA to the FOPNL and Eat Right

[105] https://www.gtri.co.in/DisplayFlagshipReports.aspx?ID=40 (last accessed on August 13, 2024)

initiative of the FSSAI. However, these initiatives need to be strengthened and sustained through effective partnerships, and collaborations. Cross–border collaborations through MRAs and under trade agreements focused on sustainable food systems are essential to expand India's agri-food exports and strengthen the resilience of the food system.

4.1 Design a Vision Document or Road Map for SFS- Farm to fork

Instead of piecemeal regulations, India needs an overarching policy document for an integrated food system, which will ensure sustainability across the entire food supply chain, from production to consumption and waste management. Since SFS is in the domain of multiple regulatory agencies at the centre and the states, a master policy document laying down the vision of the country and a roadmap towards achieving it in the short, medium and long term will help in budget allocation, ensure co-ordinated efforts and comprehensive solutions. The transition to SFS necessitates a comprehensive vision document or roadmap that should define specific goals aimed at reducing food loss and waste, reduce use of harmful pesticides and insecticides, increase production of sustainable crops and organic food, and help develop partnerships and collaborations for projects on integrating sustainable practices across all food system components. Such a detailed action plan with roles, resources, and timelines can help address the issues given in Section 3 and cover all aspects of SFS, namely the environmental, social and economic aspects, comprehensively. The vision document may be designed with extensive stakeholder consultations, focusing on all issues ranging from appropriate crop mixes, livelihood of farmers to increasing their income, improving quality checks, capacity building and implementation of GAP, reducing wastage and improving the production of healthy food and reformulated products. There is a need for more research and multi-stakeholder consultations in areas like integrated, regenerative agriculture and carbon credits, and gender in agriculture, to ensure that the country achieves UNSDGs by 2030.

4.2 Streamline Processes and Co-ordination Across Multiple Regulators

Multiple regulators with overlapping regulations increase compliance costs for domestic producers and exporters and make it difficult to hold any single agency accountable. Hence, it is very important to have a single nodal agency for exports rather than multiple agencies regulating different aspects of the same product. All laboratories approved by the National Accreditations Board for Testing and Calibration Laboratories (NABL) and used by FSSAI should be used for exports as well as imports by different agencies. Once there are common laboratories, it will be easy to identify issues in the testing methods if any. There is need for co-ordination between APEDA and Spices Board of India for spices as APEDA looks after raw species and the Spices Board is responsible for dry to ground spices. There can be different agencies for export promotion, but the regulatory role needs to be consolidated and there should be one nodal agency to regulate, test, certify and implement traceability. Multiple governance bodies lead to fragmented use of budgets. Ideally, export, import and domestic market food safety regulations and jurisdiction should be under the FSSAI, which would have

also helped to signing of mutual recognition agreements (MRAs). This would reduce costs for exporters and leave importers with a single regulator. This will lead to increased accountability but will also reduce the cost of governance related to running multiple organisations with overlapping responsibilities.

Implementing food fortification programmes or addressing micronutrient deficiency will need co-ordination across different agencies of the government at the centre, and between the centre and states. Regular update from states on a set format in areas such as scheme utilisation and their impact would have helped to share best practices across states. Basically, data collection in a structured format can also help set enhance transparency and accountability.

4.3 Address Regulatory Gaps

Several regulations related to SFS are still in the pipeline. This includes addressing policy gaps in food waste management, animal welfare standards, animal food and feed standards, animal antimicrobial resistance and FOPNL to name a few. There is need to develop these regulations across states and, for some, the centre can come up with model regulations for states to adopt. This will help to bring in some form of standardised norms. FSSAI may explore mandatory food fortification for products like staples for common diseases and to address micronutrient deficiencies.

4.4 Implement Farm-to-Fork Product Traceability

SFS needs traceability. To enhance traceability from farm-to-fork and strengthen accountability in India's food supply chain, it is imperative to address several key issues, including regulatory gaps in the monitoring process, technology gaps and knowledge and/or capacity gaps. FSSAI must lead the charge in implementing robust traceability systems, ensuring transparency and compliance throughout the food supply chain. Improving record-keeping at *mandis* to track produce origin, enforcing stricter food safety protocols and enhancing domestic market compliance are essential steps towards better product traceability.

APEDA's existing traceability procedures for export products like grapes highlight the importance of robust systems. The "GrapeNet" is the first internet-based, end-to-end traceability software system for monitoring pesticide residue in fresh grapes exported from India to the EU.[106] APEDA has implemented traceability for organic and other products, which can be replicated for the domestic market. However, the concept of traceability and record keeping needs to be incorporated in all policies and schemes of the government so that there is traceability from farm to fork. In this context, leveraging schemes like the *Rashtriya Krishi*

[106] https://apeda.gov.in/apedawebsite/Archive/GrapeNet/index.htm (last accessed on August 9, 2024)

Vikas Yojana that focus on developing pre- and post-harvest infrastructure, and soil health cards, which guide farmers on soil nutrients,[107] can support the overall goal of enhanced traceability.

4.5 Facilitating Easy Access to Data and Information

When data is hidden or difficult to obtain, it hampers the ability to evaluate the true impact of policies and schemes. Lack of transparency can lead to inefficiencies, prevent accurate assessments and obscure the real outcomes of government initiatives. By ensuring that data is accessible and well-organised, policymakers can better track progress, measure success and adjust strategies as needed, leading to more effective and responsive governance and data-driven policymaking

4.6 Reducing Trade Barriers by Strengthening Quality Testing and Certification

New trade challenges such as supply chain disruptions, protectionism and rising trade costs are impacting the agri-food sector. Sporadic export bans hurt farmers and all players in the export supply chain as importers consider India an unreliable supplier. We should build resilient supply chains.

Efficient logistics and fast-track cargo clearances are critical for the export of perishable agri-food products. It is equally important to remove non-tariff barriers (NTBs), such as stringent sanitary and phytosanitary (SPS) requirements and complex barriers for raw materials and intermediate imports used in processing (Prasad, 2017). The overlapping process and quality testing requirements for exports have to be streamlined and there should be a comprehensive agri-export policy that would lay down procedures to help comply with SPS conditions of 10-15 key export markets. More initiatives like TraceNet[108] by APEDA should be introduced to ensure quality and facilitate certification for the export of organic products from India. The establishment and modernisation of testing laboratories are crucial to ensure that products meet international standards, particularly in developed country export markets.

India should also pursue mutual recognition agreements (MRAs) in certain areas like organic products, which will reduce compliance costs and help adhere to the standards of the importing country. The core issue here is that while APEDA is the nodal agency for MRAs, in most cases the importing country would like FSSAI to be the nodal agency, as FSSAI has the mandate for food safety and standards and imports. In most countries, the food safety authority is the nodal agency for MRAs. India, being one of the largest agri-exporters and organic producers in the world, can use its trade agreements to sign MRAs and drive exports

[107] https://pib.gov.in/PressReleasePage.aspx?PRID=2002012 (last accessed on July 28, 2024)

[108] https://apeda.gov.in/apedawebsite/TracenetOrganic/TraceNet.htm#:~:text=TraceNet%20collects%2C%20stores%20and%20reports,organic%20supply%20chain%20in%20India. (last accessed on August 9, 2024)

and ensure regulatory co-operation to help promote exports. Therefore, the country should have a strategy/plan to discuss SFS in trade agreements.

4.7 Having a Higher Budget Allocation for SFS

There is a need for investment in setting up relevant processes, infrastructure and capacity building for SFS. In the Union Budget, there should be a dedicated budget component for SFS, covering different sub-segments. Funds can be allocated to address existing infrastructure gaps and mobilise investment in agriculture infrastructure. Dedicated funds can be allocated for quality organic inputs, for food fortification initiatives, and to address the high cost of a healthy diet for the poor through government programmes. There is over investment in some parts of the country and underinvestment in others leading to food wastage. There is need to prioritise strategic investments to enhance cold storage facilities across remote regions and ensure equitable distribution to mitigate regional disparities. It is equally important to have standards for warehouses, slaughterhouses, pack houses, etc., and have modern infrastructure for animal husbandry, including well-planned cattle housing to improve sanitary conditions. The establishment of community-level hygienic slaughterhouses and cold storage should be accelerated to strengthen linkages between markets, and waste disposal systems. For instance, the Livestock Health and Disease Control Scheme can focus on strengthening veterinary infrastructure along with other activities like prophylactic vaccination programmes, capacity building and disease surveillance.[109]

The establishment of certification bodies in areas like the north-east and increasing investment in research and development infrastructure are crucial for ensuring high-quality standards and meeting international requirements. Implementing fast track cargo clearance infrastructure through the use of technology and green channels for agricultural exports at all major airports will help reduce delays and wastage of perishable products.

4.8 Implement a Targeted Tax incentive or Subsidy Programme for Nutritious Foods

To promote the consumption of nutritious foods and support sustainable agricultural practices, a targeted tax incentive or subsidy programme should be established. It is crucial to improve the nutritional status of the people and to move into a nutrition-based tax system.[110] By linking GST rates or PLIs to nutritional quality, governments can create economic incentives for both consumers and producers. For instance, lower GST rates on no-added-sugar fruit and vegetables-based beverages and a sugar-linked tax for high sugar products will support product reformulation. Similarly, production linked incentives should only be given to nutritious products or fortified food, if the manufacturers are willing to make healthier options more affordable and attractive.

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109 https://dahd.nic.in/schemes-programmes/lh-dc#:~:text=The%20overall%20aim%20of%20the,and%20strengthening%20of%20veterina ry%20infrastructure. (last accessed on July 28, 2024)

110 https://www.downtoearth.org.in/news/health/india-s-ultra-food-processing-sector-growing-who-calls-for-nutrient-based-tax-model-91336 (last accessed on June 13, 2024)

Third party laboratory testing and certification for organic products can be subsidised. Overall, governments can drive positive changes in both public health and agricultural sectors by aligning tax and subsidy policies with nutritional and quality goals.

4.9 Implement GAP and Initiatives like the International Year of Millets 2023

Good Agricultural Practices (GAP) are essential to ensure sustainable and environment friendly farming by improving crop yields, reducing resource use, and minimising environmental damage. The government should support producers in adopting GAP, which is essential for international food safety standards, and address sanitary and phytosanitary (SPS) issues. Implementing GAP uniformly across the country will help in achieving consistency in quality and help to protect the environment, simultaneously ensuring economic resilience for farmers.

Initiatives like the International Year of Millets 2023, which not only raise awareness of the benefits of sustainable agriculture produce, but also encourages practices that enhance soil health and resilience to climate change, should continue but with a focus on healthy millet options. There are many examples of pilots and best practices across states that have been discussed in this policy brief and that can be adopted by other states. It is important to identify, fund and scale up good initiatives.

Chemical fertilisers are available in plenty; in contrast, the availability of bio-chemicals and green inputs is limited. Therefore, it is important to map and manage the availability of quality inputs with the support of trained agriculture extension workers.

Furthermore, an ongoing survey by the authors found that many Indian farmers are eager to transition to bio-fertilisers and green inputs, but they often lack the knowledge and financial resources to make this shift. So, such inputs have to be made affordable and accessible through the right policies.

The curriculum in agricultural universities should be updated and students should be imparted lessons on modern agricultural techniques and GAP, which can be applied at the ground level. Agricultural universities can have farm-level programmes to enable practical application of knowledge. Farmers can be trained in methods like netting/bagging and they may be encouraged to adopt these to protect their crop. There is need for agricultural extension programmes.

4.10 Engage in Collaborations and Partnerships

There is a need for India to discuss co-operation on SFS in international forums, including its trade agreements. While many measures have been taken by the Indian government on SFS, the country seems to have a defensive positive in trade agreements. As a key exporter, there is scope for multi-stakeholder engagements and collaborations, both within the country and internationally, to strengthen SFS and implement best practices on sustainability across the food chain. Stakeholders also identified some areas of collaboration including food fortification,

product reformulation, managing food fraud and losses in agri-value chains, and community-based programmes and public procurement programmes on healthy diet that can be implemented through public-private partnerships.

An example of partnerships and opportunities to strengthen and harmonise actions for nutrition is India's *POSHAN Abhiyaan,* which has now been adopted by other South Asian countries like Nepal.[111] Such collaborations and partnerships will help ensure equitable nutritional outcomes in the region by focusing on agriculture, the food environment and diet. India can also lead multi-stakeholder consultations and partnerships in South Asia on food security and SFS. It can work with like-minded countries in the region like Bhutan, Nepal and Bangladesh to reduce pesticide and insecticide residue levels. Co-operation/collaboration and learning from the best practices of trade partners like EU will benefit Indian farmers and small and medium enterprises (SMEs) as it is our key export market. Joint capacity building programmes with trading partners like Australia, the EU and its member states and the UK, and regulatory co-operation and sharing of information will be beneficial for Indian farmers, producers, state policymakers, export control agencies, etc.

Ensuring sustainability in India's food systems is crucial to meet growing food demand, combat malnutrition, and address the rise of over-nutrition related diseases. While initiatives like Natural (Organic) Farming, POSHAN Abhiyaan, and the LiFE Campaign have made progress, a more comprehensive approach is needed for a lasting impact and India has a long way to go. There remains the pressing need for an overarching policy document for an integrated food system to ensure sustainability across the entire food supply chain, from production to consumption and waste management, which will include clear goals such as reducing food loss, minimising harmful pesticide use, and increasing sustainable and organic food production.

Moreover, incorporating best practices from countries like the United Kingdom (UK) and the USA, which have implemented advanced food waste management strategies, could significantly enhance India's efforts. For example, the UK's Love Food Hate Waste[112] campaign and the USA's Food Recovery Challenge[113] emphasises reducing food waste at both the consumer and industrial levels. Additionally, countries like Denmark and Finland have successfully improved the nutrient content in foods by regulating food fortification and encouraging balanced diets. Co-ordinated efforts across regulatory agencies, extensive stakeholder consultations, business partnerships, and international collaborations can drive the adoption of these global standards and foster economic incentives tied to nutritional quality.

Scaling up successful initiatives and embracing innovation in agriculture and nutrition policies will be key to improving public health, meeting the UN's 2030 targets and progressing towards a more sustainable and equitable food system.

111 https://poshan.ifpri.info/delivering-for-nutrition-in-south-asia-equity-and-inclusion-concept-note/ (last accessed on August 13, 2024)
112 https://www.wrap.ngo/taking-action/citizen-behaviour-change/love-food-hate-waste (last accessed on August 14, 2024)
113 https://www.epa.gov/sustainable-management-food/learn-about-food-recovery-challenge (last accessed on August 14, 2024)

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Indian Council for Research on International Economic Relations (ICRIER)

Our Offices:
4th Floor, Core 6A, India Habitat Centre, Lodhi Road, New Delhi-110003

The Isher Building, Plot No. 16-17, Pushp Vihar, Institutional Area, Sector 6, New Delhi-110017

O: +91 11 43112400, **F**: +91 11 24620180 | **W:** www.icrier.org | **E:** info@icrier.res.in