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Knowledge Report

FOOD CONSUMPTION PATTERN AMONG THE LOW INCOME HOUSEHOLDS IN ASIA

Report prepared by

teri school of advanced studies

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(List of participants in Annexure 1 and 2, and Table A1- A4).

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Abbreviations

AAN	Alternative Agriculture Network
ACCD	Action Centre for City Development
ADS	Agriculture Development Strategy
AFSP	Agriculture and Food Security Project
APEDA	Agricultural and Processed Food Products Export Development Authority
CVD	Cardio Vascular Diseases
EU	The European Union
F&V	Fruit and Vegetables
FAFH	Food Away from Home
FAO	Food and Agriculture Organisation
FBS	Food Balance Sheet
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
HH	Households
HYV	High Yielding Varieties
ICDS	Integrated Child Development Services
LFLF	Local Farmers, Local Food
MDGs	Millennium Development Goals
MNCH	Maternal New-born and Child Health
MOA	Ministry of Agriculture
MSNP	Multi-sector Nutrition Plan
NCDs	Non-Communicable Diseases
NFHC	National Family Health Z Survey
NGOs	Non-governmental Organisations
NPA-FN	National Plan of Action for Food and Nutrition
NPOP	National Programme for Organic Production
NUCS	Neglected and Un-Utilized Crop Species
OABC	Organic and Beyond Corporation
PAP	Poverty Alleviation Programme
PGS	Participatory Guarantee System
PKVY	Paramparagat Krishi Vikas Yojana
R&D	Research and Development
RPAC	Regional Policy Advocacy Component
SCP	Sustainable Consumption and Production
SDG	Sustainable Development Goals
SUN	Scaling Up Nutrition
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNEP	United Nations Environment Programme
USD	US Dollar
USDA	United States Department of Agriculture
WHO	World Health Organization
WTO	World Trade Organisation

Executive Summary

This report presents the finding from the study on food consumption pattern and shifting towards healthier and sustainable diets in Asia. In this report 'Asia' covers South, South-east and North-east Asia.

Food consumption pattern in Asia

The dietary pattern in Asia is very diverse and intrinsically linked with the cultural and religious practices. Traditional diets in South-east Asia usually have rice as a staple dish while in South Asia it's a mix of both rice and wheat with accompanying vegetables, herbs and spices and in most parts except in India and a few South Asian countries is accompanied by fish and animal protein. There has been a noticeable diversification of these staples across Asia especially since 2000. Subsequently, there is an increase in total calorie availability, with a regional increase of over 19% in South-east Asia.

The changing dietary patterns have led towards a "nutrition transition" in the region which is in consonance with Bennett's Law where 'diets move away from staple products (grains) towards non-staple food items (meat, dairy, fish, fresh produce) with rise in income. The shift in diets is associated with an increased risk for various non-communicable diseases (NCDs) in the region. There is also a shift from traditional to more processed and "fast food" consumption across the region with maximum consumption seen amongst the younger generation. Dietary habits are acquired at a young age; hence these transformations are most apparent in younger generations, who are forming their lifelong habits. According to "The Global Burden of Disease" study (2017), Asia was found to be consuming more than the optimal limit for sodium, as well as sugared beverages.

The nutrition transition in the region, especially in South and Southeast Asia is occurring at a faster rate in mid and lower-income groups. In the lower-income households, contraints on access to food leading to hunger and nutritional insecurity is a persistent challenge. Various actors are making numerous efforts (Government, development organizations, civil societies, etc.) to address these challenges. Economic growth has led to an increase in the purchasing power of people and thereby better economic access to food. However, studies have shown that the rise in income and modernization of food systems has improved access to food and has led to rising meat consumption, eating out and purchase of cooked foods. Thus, the challenge is to ensure that the transition is towards healthier and nutritious diets.

The consumption of fruits and vegetables, which are a key source of micronutrients remains proportionally low even though the overall supply of the same has increased. Research has indicated that policies play an important role in influencing the eating habits of the people. The availability of food alone does not guarantee good nutrition in today's surplus producing global regime. Eastern Asia has shown modest progress with all countries progressing well towards reducing stunting and majority countries on course with reducing wasting

Factors that can facilitate a shift towards healthier and sustainable diets in lower income households

The transitioning dietary pattern across Asia which are deviated more towards unhealthy and unsustainable diets needs to be addressed. There are many factors which could facilitate a shift towards healthy and sustainable diets, such as consumption of more environmentally sustainable and healthy food options. There is a need to ensure that food is easily accessible, affordable and nutritious while ensuring they are produced in a sustainable manner. For instance, organic food, which is not only free of pesticides and environmentally friendly but also is also beneficial to human health as they are grown in the most natural environmental conditions which makes them the least toxic and harmful for the human consumption.

A number of crops that have been part of Asian history and culture and are known for their nutritional and medicinal values are now either neglected or have lost their significance over the modern foods. Such crops are given the term neglected or under-utilized food crops, traditional crops, etc. Food produced locally can help reduce the food miles and let people consume fresh and nutritious food at affordable prices; local food will have reduced transport cost and will have lower food wastage during shipping and storing. One of the most nutritionally rich options of food are the fruits and vegetables, but unfortunately, they are the least consumed and preferred food options across Asia especially in the low-income household as they are not very cost efficient. Hence, there is a need to promote these sustainable food options and make them easily accessible to the people by various ways like awareness campaigns, policy frameworks, cost reduction etc.

Organic Food

Within the purview of food security, organic food plays an important role as it increases accessibility to healthy, pesticide-free (and sustainably produced food. A study by Lairon (2010) found that vegetables and fruits cultivated by organic regulations have about 50% fewer nitrates, are rich in antioxidants in comparison to their non-organic counterparts. Organic farming lowers the danger of crop failure and stabilizes the returns to small farmers' families and enhances their quality of life. Organic food being nutritious and environmentally feasible option, has certain norms attached to it posing as a barrier specially at the consumption ends, over the production and supply.

A large number of small and marginal farmers in Asia are de facto organic. Promoting organic farms among these farmers can not only sustain the environment but also protect the farmers' health from impact of harmful chemicals, provide better nutrition and enhance their income.

Countries like China, Vietnam, Nepal, Thailand and India are constantly looking to improve the willingness to pay of the consumers of organic products. To supplement this, governments must collaborate with elements such as NGOs, Certification bodies, market entities and production players, which will ensure natural-food literate consumer, thus driving food security and sustainable development across Asia.

Neglected and Under-utilized Food Crops (NUFC's)

Neglected and under-utilized food crops are very prominent as centres of diversity amongst the traditional farmers and local communities. The commercialization or globalization of the agricultural markets remains a major challenge for promotion of these crops. There are about 778 species (261 fruits, 55 root or tuber, 213 vegetables, 28 millets as well as pseudo cereals, 25 industrial crops, 34 nuts, 14 grains legumes/ pulses and 148 others) of under-utilized species present in the Asia-Pacific region which are not utilized to their full potential. These crops have great prospects for use as they are highly rich in vitamins and minerals that could be very beneficial to human society. For example: Sweet Potatoes and Date Palm found in the Asian

region are very advantageous because they are a fibrous diet and extremely rich in carotenoids and pro-Vitamin A and antioxidants.

Neglected food crops can be a potential source to tackle problems related to climate change as they can be well adapted to extreme weather conditions and thus form part of sustainable food production as it offers subsistence farming. Bhutan has launched a project "Participatory On-Farm Conservation, Sustainable Use and Management of Neglected and Un-Utilized Crop Species (NUS) for Livelihood and Adaptation to Climate Change". NUFCs are also a good source of proteins and associated nutrients which can be suitable for human consumption along with economic and medicinal benefits.

Local food

Food systems having their bases laid out in the local ecosystems are being seen as the solution to reducing food miles. The local food system has a shorter supply chain implying lesser intermediaries. It also signifies local cultural and symbolic values of the region or country. Rice is the highest consumed local food in spite of many other options available.

The urban poor faces the burden of food miles and increased prices very severely which is then reflected in their diets. Hence, urban farming which promotes production of local food for self- sufficiency and diet diversity becomes an essential and sustainable method of food security for urban poor. Malaysia's agriculture policies and initiatives have a history of promoting local food production. The 'Green Book' programme is one such example. In India, programmes like Do-It-Yourself kit helped to promote local food consumption. Overall, urban agriculture is an emerging practice in many parts of Asia which provides wide range of functions such economic revitalization, effective city supply chain, community engagement, waste management, energy conservation, biodiversity etc.

Traditional Food

The multicultural societies adhere to the passage of the traditional knowledge on food to the next generation as a practice of maintaining the cultural identity throughout generations. The knowledge of traditional practices, and dietary pattern over time has got restricted within the boundaries of the rural and indigenous households which is also in a threat of over powering by cheap processed foods. The United Nations in its recent move approved the Indian government's proposal of declaration of 2023 as International Year of Millets. The resolution was supported by more than 70 countries. The recognition of the indigenous crop at an international level is expected to alleviate the status of the crop as well as maximize the income of farmers. Traditional Japanese cuisine (Washoku), was listed on UNESCO's list of intangible cultural heritages in 2013.

The modern-day food habits have brought a revolutionary change in the traditional food systems; over the decade with urbanization the food choices of people have evolved due to the better purchasing power, rapid development, rise in fast food joints and need for ready-to-made food. There is no much experiment done yet to convert the traditional foods into handy, easy to made foods and thus there is a lack in popularity of the traditional foods.

On the side of production, traditional food is taken over by hybrid food and modern agricultural practices, however traditional food is environmentally feasible and is resistant to environmental havoc like droughts, floods and pest infestations. There is a dire need to protect the traditional food and crops in order to protect our rich cultures and also to protect and maintain the food as well as the nutritional security in today's as well as the upcoming generations. Thailand has done a great job in promoting its traditional food through the Global Thai programme. Countries like Japan and Vietnam also have an impeccable history of traditional food practices and have multiple health benefits and resistance to many NCD's which are prevalent all over the world today.

Fruit and Vegetables

Fruits and vegetables (F&V) are essential for a balanced diet, however most of the planet's population consumes them in minimal proportions. To obtain health as well

as nutritional benefits, the World Health Organization (WHO) encourages taking at least 400g each day. In 2017, 3.9 million fatalities were attributed to a lack of fruits and vegetables over the world (WHO, 2019). The UN declared 2021 as the International Year of Fruits and Vegetables in order to enhance consciousness of the health as well as the nutritional importance of fruits and vegetables, as well as their significance to a balanced diet & lifestyle.

Developing countries, "on the other hand, continue to be the largest suppliers of fresh exotic fruits and vegetables to the developed nations". Most "emerging countries, such as Asia (China) and South America, have seen a significant rise in F&V productivity". Asia is the world's biggest vegetable producer, with a 61% in total output and a 51% annual growth rate". The Global "Burden of Disease Study, which included people from 113/187 countries and accounted for 82% of the global population, found that low intake of F&V is responsible for 14.6% and 7.6% of cardiovascular disease mortality respectively, with India having the highest absolute death rate of 11.6%."

There are high pre- and post-harvest losses and risks related to fruit and vegetables. The consumption inequality in South Asia remains a fact and income are not the sole differentiator between consumers. For instance, studies have revealed that women in India were consuming lower levels of F&V than their household members due to social pressures, systemic inculcation of consuming less, etc. Some of the most effective strategies to improve F&V consumption without affecting the supply chain or purchasing power include providing point of sales health information regarding the benefits of increased F&V consumption and incentivizing the consumers.

A variety of factors influence the consumption pattern, one of the most significant ones being purchasing power. Generating awareness and training and capacity have played any important role improving the food intake. Further, females and other marginalized groups are more disadvantaged. Understanding the drivers and enablers controlling the consumption patterns will aid in formulating strategies to improve consumption patterns that are healthy for humans and sustainable for the environment.

CHAPTER 1

1. Introduction

Asia is home to about 60% of the world's population while it shares about 30% of the world's land area. It has a diverse landscape; deserts to tropical moist ever green forests and low-lying coastal areas to high mountains. It also hosts a wide range of biodiversity which include a number of endangered species. Asia is also home to five out of eight Vavilov's centres of origin for crop species and agriculture[1]. For example, the Vavilov's India Centre is based around rice, millets, and a number of legumes. Currently, India and China lead in a production of a number of agricultural crops and dairy products. However, a large portion of the hungry people on earth resides in Asia.

The food system from 'farm to fork' employs a large percentage of the world's population. In Asia and the Pacific, a significant portion of the national GDP comes from agriculture, fishery, and allied sectors. However, the current food production and consumption pattern are unsustainable for both human health and the environment (Willet et al., 2019). Most farmers comprise small and marginal farmers a large number of which are rainfed farmers. The entire food system in the region faces various challenges such as climate risk, natural disasters, biodiversity loss, poverty, poor infrastructure, pollution and resource scarcity. Thus, ensuring the sustainability of the food system (production, processing, transporting, market and consumption) is essential for improving livelihood and sustainable development in the region. Whilst the realization of the SDG would ensure a safer environment and healthier wellbeing.

There is rapid urbanization over large parts of Asia, and currently, about 50% of the population lives in urban areas. For the majority of these urban population efficient food market and accessibility are essential for ensuring food availability and access. Studies have shown that urbanization impacts both quantity and quality of food consumption including the dietary diversity (Bhartendu et al., 2020) while risks such as climate change, natural disasters, price volatility, etc., impacts the food accessibility of the lower income households. There are strong interlinkages between green growth, poverty and achieving food security. It is essential for various stakeholders to play their part in sustaining the food systems. For instance, institutions can play their part by sourcing from sustainable farming systems; awareness and educational campaigns can also influence behavioural changes toward more sustainable consumption patterns. The Eat Lancet Report (2019) suggests the need for a radical transformation of our food systems. In this context, there is, therefore, a need to understand the trends in the food systems, the challenges it faces and identify the best-case studies in the region.

The EU-funded SWITCH-Asia Programme aims at supporting the development of green economy and the transition towards a low-carbon, resource-efficient and a more circular economy in Asia promoting economic growth while decoupling it from environmental degradation. The SWITCH-Asia Regional Policy Advocacy Component (RPAC), implemented by United Nations Environment Programme, is designed to strengthen the dialogue at regional, sub-regional and national policies on Sustainable Consumption and Production (SCP) and thereby contributing to green growth and reduction of poverty in Asia.

This study was conducted to get an overview of the food consumption pattern in North-east, South-east and South Asia and to examine the various sustainable consumption practices aligned with the EU's 'Farm to Fork' strategy 2.4. on sustainable food consumption and healthy diet.

[1] https://www.bioversityinternational.org/fileadmin/bioversity/publications/Web_version/47/ch06.htm

CHAPTER 2

2. Methodology and Study Area

2.1. Study Area

The study targeted at the 18 Asian countries[2] which the SWITCH-Asia Programme covers, including South-east Asia, East Asia and South Asia.

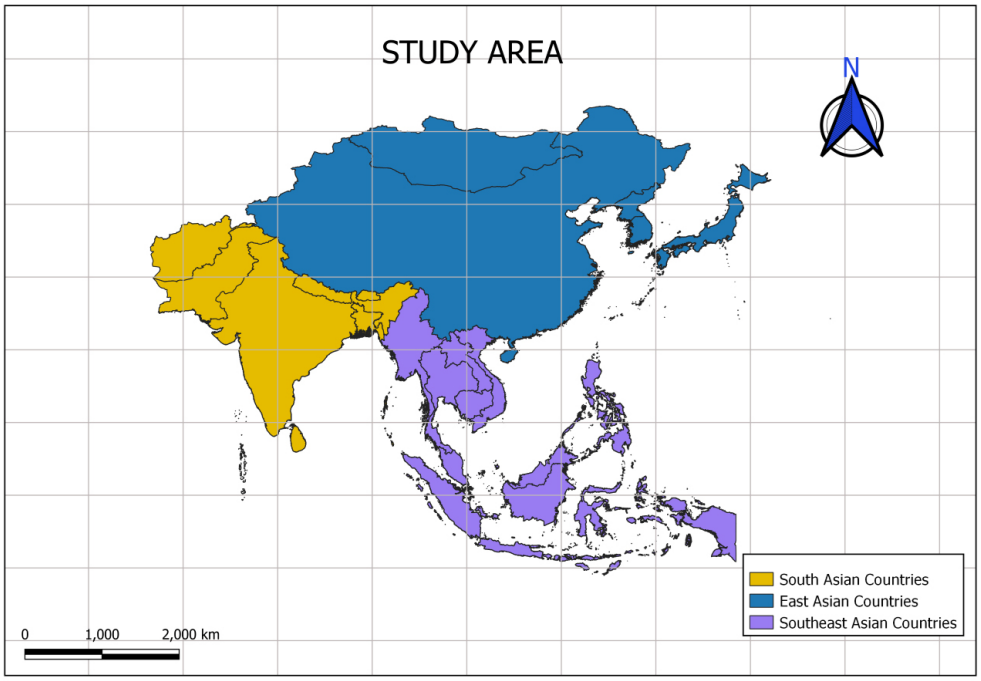

Figure 1: Map indicating the countries in Asia where the study was conducted.

2.2. Methodology

This study was conducted using secondary literature and data on food consumption pattern in Asia.

A baseline study was conducted using a comprehensive literature review to examine the food consumption pattern in Asia. From the literature, various sustainable consumption aspects were identified which laid the foundation for further analysis. The key sustainable consumption aspects included traditional food, organic food, fruits and vegetables, neglected and underutilised food crops, etc. Three closed Focus Group Discussions (FGD) and a regional dialogue were held to gather first-hand information on food consumption patterns from various stakeholders. An outline of the study is provided in **Figure 2**. The Eat Lancet Commission (2019) reference Healthy Diet was used to examine the dietary pattern of various countries.

[2] https://www.switch-asia.eu/countries/

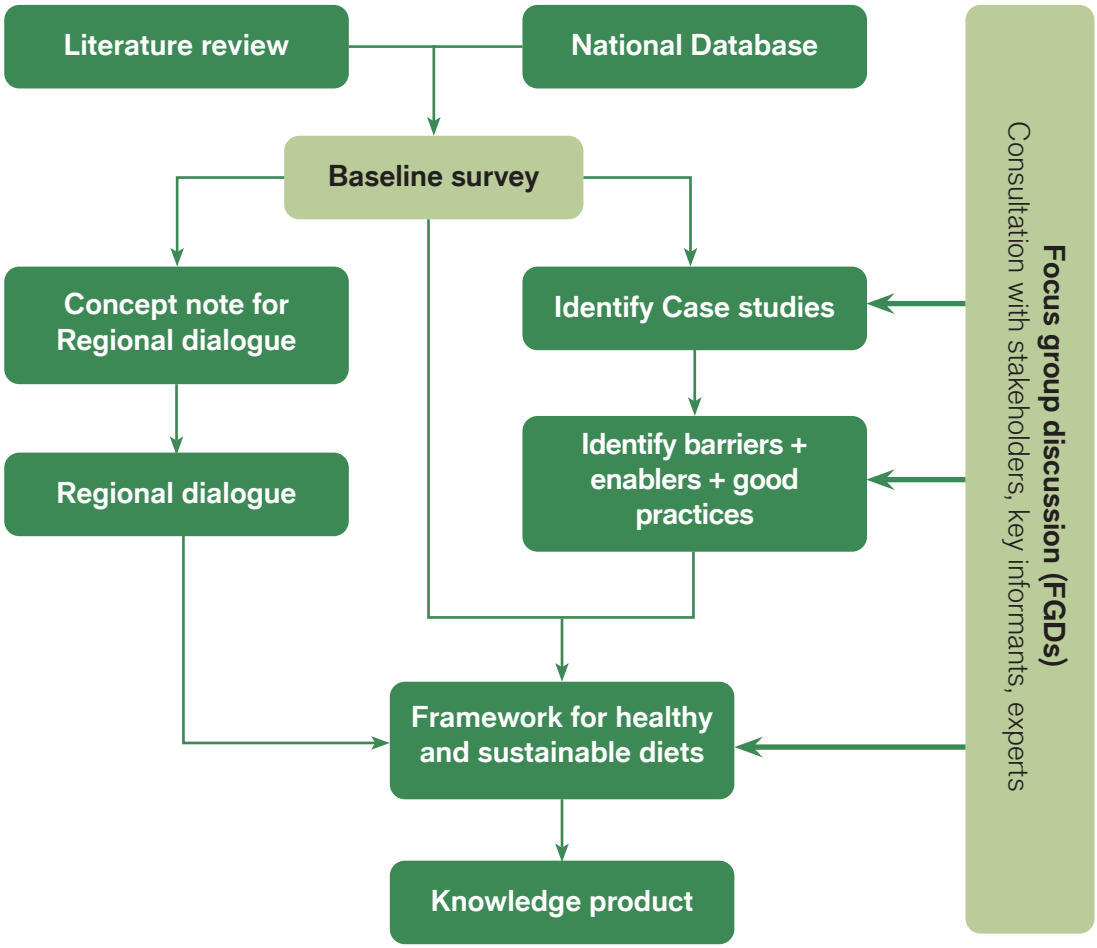

Figure 2: Outline of the methodology used in preparing the knowledge report.

CHAPTER 3

3. Overview of Sustainable Food Consumption and Dietary Pattern in Asia

3.1. Regional Patterns of Food Consumption in South, South-East and East Asia

Nutrition and consumption traditionally have local roots and begin with local culture, resources, geography, history and genetics. The dietary pattern in Asia is very diverse and intrinsically linked with the cultural and religious practices. Traditional diets in South East Asia usually have rice as a staple dish (many cultures even consume rice for all meals of the day) with accompanying vegetable dishes and meat or fish (Tezzo et al., 2021; Lipoeto et al., 2012; Saloma & Akpedonu, 2016). This could additionally also have soups, curries or broths and even fish paste as accompaniments with rice and pickled vegetables, fish or meat (Tezzo et al., 2021; Esterik, 2008). Having a wide variety of side dishes is also indicative of prestige in Chinese culture (Lange, 2016). A traditional Korean meal is low in fat and very heavy in proportion of vegetables consumed (Lee, 2016). Most cooking practices employ frying only for smaller accompaniments and use boiling, stewing, steaming, fermenting, grilling and stir frying as main techniques (Esterik, 2008). Such techniques are also highly efficient at preserving the nutrients in foods.

The traditional South Asian diets show a strong sense of heterogeneity in food choice, preparation methods and consumption patterns. Traditional Sri Lankan food is known for its medicinal properties and practices for reducing overconsumption (Bandara et al., 2021). The traditional food consumed in India stood out for use of fabulous and diverse spices (Prakash et al., 2020). Vegetarian diets practiced on account of religious reasons are unique to Indian culture (Prakash et al., 2020). Bangladesh has a rich history of traditional wisdom in agriculture and allied practices (Prakash et al., 2020). *Annexure 3: Table A* provides a summary overview of dietary traditions of South, East and Southeast Asia.

3.1.1. Per capita food supply pattern

The Food Balance Sheets (FBS) of the United Nations Food and Agriculture Organization (FAO), provides a detailed estimate of the food supply pattern during a specified reference period presented in terms of per capita supply of all food commodities in terms of food, fat, and protein supply (FAO, 2021). The total food supply/availability across regions- South, East and South-East Asia increased by 6.7%, 11.8% and 18.9% respectively between the year 2000 to 2018. The food supply per capita/kcal/day across the three regions exceeds the EAT Lancet recommended healthy diet per capita/kcal/day of 2500. In terms of South Asia, it only exceeds marginally while in the other two regions it exceeds by a significant number.

Since 2000, the total calorie availability has increased by 19% in South-east Asia region (Table 1). However, a relatively low-calorie availability has been observed in Vietnam, Lao People's Democratic Republic and Myanmar. In Afghanistan at 2,040 kcal/capita/day, calorie availability remains very low and insufficient for adequate nutrition. In Eastern Asia, calorie availability at 3152 kcal/capita/day for all countries except Mongolia is way above the EAT Lancet recommended intake.

Table 1: Current per Capita Food Supply in South and South East Asia as per Food Balance Sheet Regional.

EAT Lancet recommended	Food Supply (kcal/capita/day)			Fat Supply (g/capita/day)			Protein Supply (g/capita/day)		
	2500			51.8			209		
Region/Year	2000	2018	% Increase	2000	2018	% Increase	2000	2018	% Increase
South Asia									
Afghanistan	1790	2040	14	32.1	31.9	-0.7	52.6	55.5	5.6
Bangladesh	2258	2563	13.5	27.4	34.4	25.7	48.5	60.7	25.3
Bhutan	-	-	-	-	-	-	-	-	-
India	2380	2533	6.4	45.7	58.9	29.1	56.6	63.4	11.9
Maldives	2435	2235	-8.2	59.9	50.8	-15.3	98	81.3	-17.1
Nepal	2257	2769	22.7	37.6	54.8	45.5	57.3	74.3	29.7
Pakistan	2398	2486	3.7	64.4	78.1	21.3	61.7	67	8.6
Sri Lanka	2315	2737	18.2	44.3	57.5	29.7	51.9	65.2	25.6
South Asia (Avg.)	2390	2550	6.7	46.36	59.24	27.8	57.54	64.54	12.1
North East Asia									
China	2814	3203	13.8	76	100.4	32.1	84	101.6	20.9
Democratic People's Republic of Korea (DPRK)	2147	2019	-6	35.8	34.5	-3.7	61.2	53.3	-12.8
Mongolia	2177	2579	18.5	80.1	98.8	23.4	81.6	87.3	7
North East Asia (Avg.)	2818	3152	11.8	76.64	98.83	28.9	84.76	99.66	17.6
South East Asia									
Cambodia	2115	2492	17.8	29	35.3	21.7	51.4	66	28.3
Indonesia	2436	2884	18.4	44	61.1	38.7	52.7	67.3	27.9
Lao PDR	2116	2758	30.3	26.4	47.3	78.9	56	76.9	37.3
Malaysia	2841	2845	0.1	85.7	90.1	5.1	76.4	77.5	1.4
Myanmar	1910	2673	40	38	78	105.5	50.3	90.6	80.3
Philippines	2392	2662	11.3	50	57	14.1	54	62.5	15.9
Thailand	2604	2804	7.7	54.8	64.7	18.1	59.4	63.4	6.6
Vietnam	2239	3025	35.1	38.7	87.5	126.3	54.8	98.9	80.3
South East Asia (Avg.)	2377	2828	18.9	46.15	66.69	44.5	54.86	73.19	33.4

Source: FAO 2021

3.1.2. Patterns in consumption and dietary shifts

Considerable shifts have been occurring in the food consumption pattern throughout the globe. Ever since there has been an increase in the capacity of world's food production and diversity in foods, an important thing to notice is the decrease in seasonal dependency for food (Kearney, 2010). There has also been a noticeable shift from staple diet, to a more diversified one. Such trends can be understood by using the Food Balance Sheets (FBS) which are compiled and tabulated by FAO.

There is an overall rise in food consumption per person as "per capita calorie availability" has increased during the period 2000-2018. It can thus be inferred, that there has been an increase in food availability and an accompanying decrease in food insecurity as a result. On the contrary, these changing dietary patterns have been observed and studied to be leading towards "nutrition transition" in these regions (Thow et al., 2020). This concept of nutrition transition argues that traditional diets of these regions are getting replaced by high-energy diets. This shift in diets is associated with increased risk for various non-communicable diseases (NCDs) in South and Southeast Asian countries. In general, the calorie supply in most of the countries is more than the Eat Lancet recommendations of 2500 kcal, except Afghanistan, Cambodia, Mongolia, and Pakistan. Particularly in Afghanistan, the calorie availability is very low (2040 kcal/capita/day) which is inadequate for providing nutrition to people. Similarly, it can be seen that all the countries in East Asia other than Mongolia, have witnessed slight increase in per capita calorie availability. South Asia particularly has very low-calorie availability and the data clearly show that there has only been limited increase in calorie supply overall, except in Nepal. For countries in Southeast Asia, Lao PDR (Lao People's Democratic Republic), Myanmar and Vietnam had low availability of calories in 2000 but except these countries, the general trend shows a considerable increase in per capita calorie availability in period of 2000-2018.

3.1.3. Dietary Diversification and Nutrition Transition

The 'Nutrition transition' encompasses changes households' (HH) consumption pattern, dietary intake, and physical activity patterns driven by economic growth and involves two stages; a shift from quantity to quality, by substituting traditional staples with non-staples, and increased consumption of processed food that rich in fat, sugar and protein (Kelly, 2016; Pingali, 2006; Pingali et al., 2019). This 'nutrition transition' is in consonance with Bennett's Law (HH diets move away from staple products like grains towards non-staple food items like meat, dairy, fish, fresh produce, with rise in income) across Asian countries. For example, in rural and urban India, the share of monthly expenditure on cereals and cereal products decreased from 41.1% to 10.8% and 23.4% to 6.6% respectively between 1971–72 and 2011–12 (Pingali et al., 2019). Some of the key components of nutrition transition are described in the following sections.

i. *Rice and cereal consumption trends*

The two major staple food in are wheat and rice; there has been noticeable diversification from these staple foods since 2000 especially in Southeast Asia. According to FAOSTAT, the share of staple foods in providing calories per capita in 2017, was only less than half the entire calorie availability in the regions of East Asia, Maldives, Myanmar, Malaysia, Pakistan, and Thailand. Though it is interesting to note that despite the general decline in consumption of rice, these regions still have highest consumption of rice with People's Republic of China, India, and Indonesia accounting 60% of total rice consumption in the world. In Bangladesh, 70% of total calorie consumption was still accounted to rice. Philippines, Vietnam are also big consumers of rice, just like Bangladesh.

While rice is still an extremely important component of Asian diets, studies show that absolute levels of consumption are either stable or declining (Reardon, 2014; Thow et al., 2020). On surface diets across Asia show a general trend towards diversification away from staples, but as per Dizon et al (2018), most food options on supermarket shelves are made from only six food ingredients, including wheat and corn. The nutrition transition trend in the countries of South and Southeast Asia is occurring at a faster rate in mid and lower income groups and also sooner at the national

level, that is, at a much lower level of Gross National Product (Gunasekera & Newth, 2014). Projecting for 2050, while overall cereal consumption is expected to steadily decline, rice- based diets will still drive intake of 253 gm of rice per capita per day in South East Asia along with a rise in consumption of wheat in these developing countries (Kearney, 2010; Lipoeto et al., 2012).

ii.*Fat consumption trends*

Except few countries where the calorie count has not increased from 2000- 2018, it can be observed for all other countries of these regions that the diversification has been majorly brought in through increase in availability of fats (both of animal and plant origin). This increase in animal and vegetable fat availability, contributes to 15% of total calorie availability in China, Malaysia, and Pakistan (Thow et al., 2020). There has also been an increased consumption of food that is cooked in fats/oils in the entire region, especially in South Asia where use of oils like Vanaspati has been common since a long time.

iii. *Processed Food Consumption Trends*

Not only has there been an increase in fat consumption, but there has also been an increase in sugar intake in diets, with particular emphasis on South Asia and Southeast Asia. The shift is also being seen from traditional to more processed and "fast food" consumption across these regions (Thow et al., 2020). Processed and ultra-processed food is already an established practice in the region having a major share of food expenditure at 60% and 30% for rural regions and 73% and 42% for urban regions (Reardon et al., 2014). As per a study on fast food consumption among young adolescents aged 12-15 years by Li et al., (2020), the prevalence of fast-food consumption at 17.7%, 4 to 7 days per week was highest in Southeast Asia. At a country level, the prevalence was highest in Thailand at 43.3%. These transformations are most distinctive in young children and youth as most dietary habits are acquired at this age (Pingali, 2007). Processed/fast foods are high in fats, sugars as well as salt which leads to a rise in health concerns. According to "The

Global Burden of Disease" study (2017), Asia was found to be consuming more than the optimal limit for sodium, as well as sugared beverages. The other foods where an increase has occurred in consumption are, baked items, various oils like edible oils, different kinds of dressings, and meats. For instance, Indonesia saw 38.73% increase in fat supply in its calorie intake from 2000-2018 and its consumption of processed food, sweetened beverages went from 13% to 31% from 1998 to 2013 (Thow et al., 2020).

iv. *Meat and fish Consumption Trends*

In the year 2017, over 15% of calories available for consumption in half the countries of South and South-East Asia, were provided through animal-based protein sources. Due to greater consumption opportunities from ease of cultivation, lower prices and lack of associated religious taboos, poultry consumption is expected to rise in countries like India and China (Lange, 2016). While in India vegetarianism, low consumption of meat, abhorrence of beef or pork in some regions and consumption in others is reflective of the presence and dominance of varied religious groups, other countries of South and South East Asia reflect only a limited role of religion in influencing consumption. Pork remains the most highly demanded meat in China (Lange, 2016). Overall consumption of eggs has increased (Kearney, 2010). Fish consumption is expected to rise (186 Mt global production in 2023) with close to 96% of this increase being accounted for by Asia (majorly India, China and Indonesia) (Lange, 2016). In India, fish consumption exceeds significantly then other animal-based food consumption and this trend is sharper for rural areas (Ibid.). Amongst aquatic foods, consumption of seafood and freshwater fish has risen more in Asian countries (Kearney, 2010).

v. *Fruits, vegetables and pulses consumption trends*

While overall food category trends are inadequate to reflect consumption patterns of individual foods in the group, it can be observed that consumption of fruits and vegetables remains proportionally low even though the overall supply of the same has increased (Kearney, 2010). With the wide production of soya, consumption of the same has increased by more than ten times in Indonesia between 1983 and 2004 while rice and cereal consumption halved (Lipoeto et al., 2012). In most parts of Asia, especially in South Asia the consumption of fruits is reported to be low (Thow et al., 2020) (**Figure 3**).

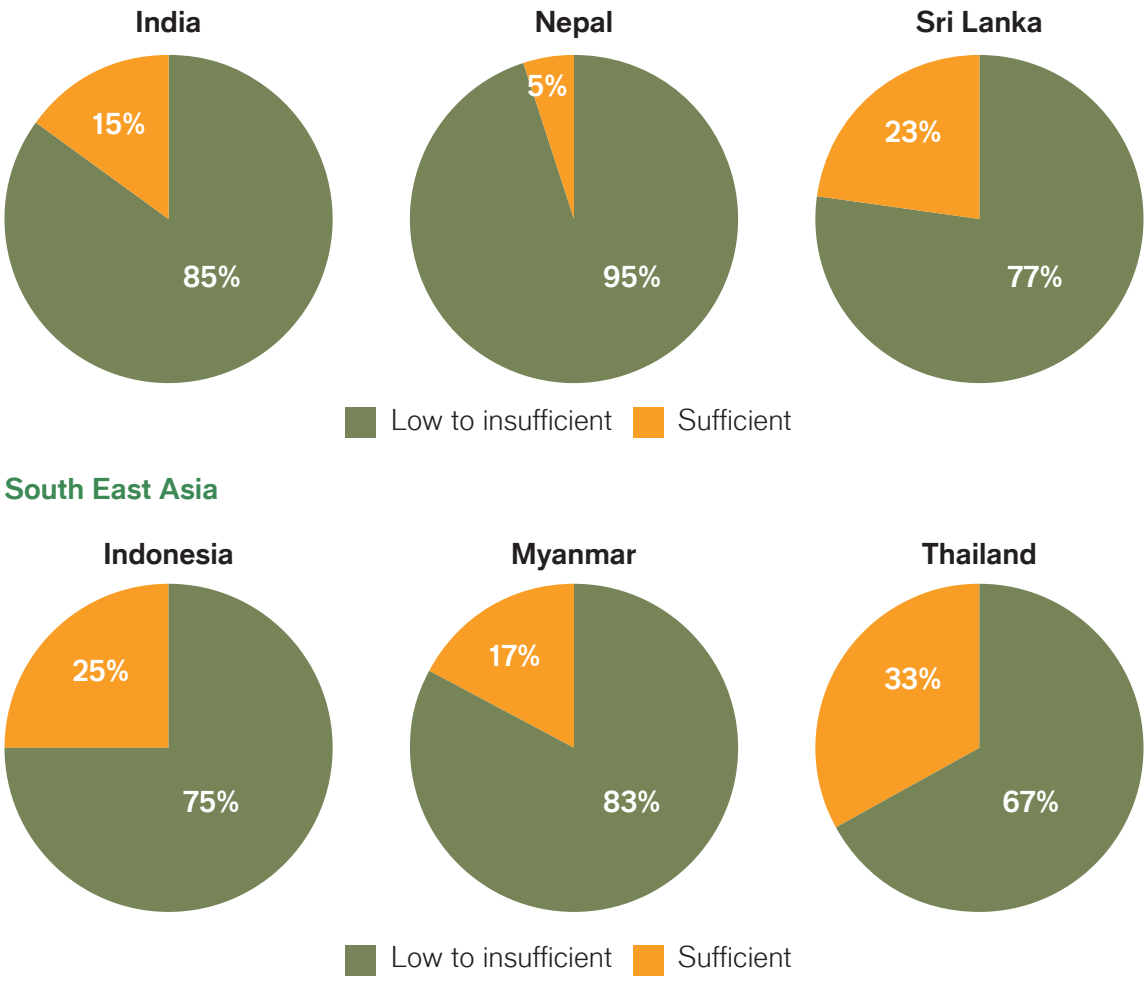

Figure 3: Consumption of fruits and vegetables among adolescents in Asia *(Data source: Throw et al 2020).*

3.2. Enablers of consumption pattern changes

The rise in food consumption has occurred as a result of two different effects – "expansion" (increased energy supply from cheaper food stuffs), and "substitution" (change in consumption of the type of food stuffs while overall energy supply remains majorly unchanged) (Kearney, 2010). The trends in the developing countries of South and Southeast Asia are more reflective of the substitution effect whereby energy dense food has taken up bigger berths in the total diet. Kearney (2010) also identifies overarching trends like increasing global per capita incomes, urbanization, trade liberalization, presence of transnational food corporations, changed patterns in retailing and marketing of food and also, consumer attitudes towards the same as drivers for the nutrition transition (**Figure 4**). Reardon and Timmer (2014) delineate three sets of five interlinked transformations for food systems as "downstream (demanding – urbanization and diet change), intermediating (rural- urban linkages) and upstream (supplying – rural factor markets, product composition and farm technology)". Asian urban markets for food depend highly upon the domestic rural-urban supply chain and also, on factor markets and farming.

Cyclically, dietary changes are also influenced by supply chain transformations which favour the production of non- grains (Reardon and Timmer, 2014). Economic growth has led to increase in the purchasing power of people which relates to rising meat consumption, eating out or purchase of cooked foods with the rise in incomes and modernization of food systems (Lipoeto et al., 2012; Lange, 2016; Ehlert, 2016).

Figure 4: Enablers of consumption.
Source: Capone et al., 2014

Lifestyles get highly constrained in urban cities and environments due to lack of time, long working hours and smaller or differently configured spaces. These new configurations essentially serve to reconfigure and negotiate twin facets of food consumption, that is, between eating as a social practice and as a commercial transaction. Eating now increasingly finds itself relocated from the framework of 'family and kin-based social obligation and reciprocity' to a commercial activity (especially through the practice of eating out) which has emerged in urban environments (Ehlert, 2016). For the consumer, eating at modern venues is also a way of social identity construction and social aspiration which has further driven the trend in emerging food businesses. Reconfigured physical spaces for dwelling in urban environments which have tended to be smaller and lacking in natural ventilation, as well as, affinity of urban lifestyles for speed and convenience have also created a propensity for eating alone (reduced sharing), eating out, consuming ready-to-eat food and getting food delivered at home (Saloma & Akpedonu, 2016; Watabe et al., 2016; Tezzo et al., 2021). Practices as routinized actions and the ensuing study of changing routines can build a socio-cultural context of consumption and help relate micro changes in eating behaviour and transformations in the food system (Tezzo et al., 2021). Such a social practice approach can help to understand how practices evolve alongside migration from rural to urban environments. A study of fish consumption practices amongst migrants in the city of Yangon in Myanmar, observes a delinking of provisioning and consumption from production, with higher reliance on local urban markets, wet markets and supermarkets for the urban consumers (Tezzo et al., 2021). Preferences were also observed to have changed with respect to farmed varieties (over wild fish), use of electric equipment in the kitchen, use of fewer or substitute ingredients in traditional recipes, but these changes instead of occurring in silos, had a feedback effect on rural food systems as well. Rural-urban migration trends have also created demands for regional cuisines in gastronomic businesses (Saloma & Akpedonu, 2016). Hence, there is now a 'hybridization of rural-urban food environments' rather than pure modernization (Tezzo et al., 2021).

Other than trends relating to economic growth, historical trade agreements and other international agreements have also influenced shifts in the traditional diets of some cultures and the same can be starkly observed in the case of Philippines and Japan. Colonized Philippines was a market for surplus American processed goods leading to the proliferation of a culture whereby processed foods came to be preferred over fresh foods (Saloma & Akpedonu, 2016). While the traditional dietary practices of Japan are deemed as valuable cultural heritage by UNESCO, meals have become unhealthier with the presence of bread, red meat, eggs, fried and processed foods in meals and most of these foods were introduced in the country as part of post-World War II aid by the USA (Watabe et al., 2016). Trade and import liberalization ultimately also reduced the nation's self-sufficiency such that even traditional food products came to be manufactured from imported ingredients.

3.3. Consequences of shifting dietary patterns

The changes in dietary patterns and consumption trends discussed above, have consequences ranging from environmental, social to health and economic ones. But the two most noticeable consequences observed are in the area of health: Double Burden of Malnutrition (DBM) and Non-Communicable Diseases (NCDs) induced by dietary changes. Even though DBM affects various countries, a large proportion of incidences are found in Low-to-Middle Income Country (LMICs). The nutrition transition towards "energy-dense" diets in general, has led to increase in obesity as well as other NCDs such as diabetes, coronary heart disease (CHD) and some types of cancers as well (Kearney, 2010). These health consequences not only affect the populations of these regions, but the countries also have to bear an economic cost for the same.

According to a review, obesity as well as overweight accounts for 2% to 10% expenditure out of countries' total expenditure on health care (Thow et al., 2020). There's a consequential socio-economic impact on people's quality of life as they have to suffer "productivity" losses as well, due to NCDs.

3.4. Dietary Consumption Patterns in Asia: Eat Lancet Framework for healthy diet

Unhealthy diets and insufficient physical exercise are two risk factors for noncommunicable illnesses, according to the World Health Organization (WHO). Unhealthy diets now cause more illness and mortality than risky sex, drink, drug, and cigarette use put together. Dietary habits are linked to human and environmental health, according to research. However, large-scale attempts to alter the global food system have been hampered by the lack of universally approved scientific objectives for healthy. The EAT-Lancet Commission brought together 37 renowned scientists from 16 countries to create worldwide scientific objectives for healthy as well as sustainable food production, from a variety of expert areas - human health, political science, agriculture and environmental sustainability, to name a few (ibid). The 2019 EAT-Lancet Commission report recommends a healthy diet that can feed 10 billion people by 2050 from environmentally sustainable food systems (Sharma et al., 2020).

This section compares food consumption patterns in Bangladesh, Vietnam, Bhutan, and Nepal to the EAT-Lancet reference diet and identifies differences. The 'healthy diet' described in the EAT-Lancet Report (2019) was used as a reference diet. The section also identifies health implications caused due to the over/ underconsumption of a particular nutrient in the diet based on the comparison with the 'healthy diet'.

3.5. Comparison of food consumption patterns with EAT-Lancet

As per the data from various sources, and many limitations, the comparison of food consumption patterns has been done with respect to eat-lancet report of Bangladesh, Vietnam, Nepal and Bhutan. To begin with, the consumption of coarse grains (such as millets) is very low across Bangladesh. In Bangladesh, around 69% of the total calorie intake in the daily diet comes from whole grains as compared to 32.4% of the recommended intake by eat lancet, and white rice was the most widely consumed whole grain in the country. Against the recommended value of 23% (Eat Lancet commission value), the intake of protein due to non-animal sources (such as nuts, beans and legumes) was found to be only 5%. The calorie intake of fruits in the daily diet is only 1% in the country as compared to the reference value of 5%. (Choudhary and Kishore, 2019). The consumption of dairy products stands at 2% in Bangladesh (Choudhary and Kishore, 2019), which is less as compared to the value suggested by the Eat Lancet Commission (6%). In Bangladesh, the amount of energy derived from added fats is 11% which is less than the recommended value of 18%. However, the studies have indicated that in Bangladesh most of the added fats come from palm oil consumption (Bangladesh: palm oil consumption 2012-2021, no date). The Eat Lancet Commission recommends zero consumption of processed food but recent studies have indicated that the consumption of processed food has been increasing in urban Bangladesh, especially in the urban areas (**Table 2**).

In Vietnam, the dietary intake of whole grains exceeds 40% against the recommended 32.4% of eat lancet (VU, 2020) this is mainly because of the excessive consumption of rice in the country. Rice is being consumed in 3 forms in the country- plain, specialty and sticky. The consumption of protein in the nation stands at only 13% against recommended 29% (VU, 2020). Tofu is an essential component of a protein rich diet in the country. The country derives 20% protein from animal- based sources (against the recommended standard of 6%). The consumption of fruits and vegetables was found to be 6.6% in the country. The consumption of fruits was found to be highly variable within the country, because calories obtained from fruits are expensive in Vietnam and only the high-income households can afford it. Morning glory (Ipomoea aquatica) was the most widely consumed vegetable, which is a rich source of Vitamin A and beta carotene for the Vietnamese. The dietary intake of added fat was found to be significantly lower in Vietnam. The consumption of the unhealthy palm oil has been steadily increasing over the years in Vietnam (Ritchie and Roser, 2021). In Vietnam the percentage of added sweeteners was found to be 3.3%, which were within the recommended value of 5%. The analysis indicates that the country needs to shift to a healthier diet. The overdependence of the country on rice is a cause of concern, as rice has a huge environmental footprint.

Nepal has been classified as a country with significant localized food insecurity (FAO, 2003). Food insecurity affects 3.9 million people in Nepal, with 40% of the population suffering from malnutrition (WFP, 2015). Cereals provide 65% of calories, with rice, maize, and wheat accounting for the majority. In Nepal, animal proteins make about 2% of the total. According to a report (Kumar, Kumar and Joshi, 2017), the majority of protein comes from grains, with rice, maize, and wheat accounting for 60% of the total. For fruit and vegetables, the suggested share is 5%, however the actual proportion is only 3% (Kumar, Kumarand Joshi, 2017). In Nepal, added fats account for barely 1% of total calories (Kumar, Kumar and Joshi, 2017). The intake of added sweeteners in Nepal's rural areas (4%) is close to the EAT-Lancet suggested share (5%). It is thus analysed that the country needs to limit its dependency on whole grains and work on increasing plant-based proteins and added fats to their diets to be closer to a healthy food consumption lifestyle.

In Bhutan, the review (Dizon, Wang and Mulmi, 2021) establishes around 20.4% of the all-out admission comes from entire grains. 6% of the day-by-day calorie's admission ought to come from non-plant. The overview establishes that 9% (Dizon, Wang and Mulmi, 2021) of the all-out protein consumption month to month in Bhutan comes from non-plant based (meat), which is extremely less. The utilization of foods grown from the ground in Bhutan are more inadequate. The utilization of vegetables and fruit products in Bhutan is 24% every year. (Dizon, Wang and Mulmi, 2021). In Bhutan, the utilization of dairy items is 40% annually as per Food-based Dietary rule (Wangdiand Tamang, 2014). In Bhutan consumption of sugar was 3.2%, which is under the suggested values (Dizon, Wang and Mulmi, 2021). The analysis shows that the country needs to move to a better healthy routine. The over-dependence of the country on creature fat is a reason for concern. Bhutan's consumption of sugars was 3.2%, which is under the suggested esteem (Dizon, Wang and Mulmi, 2021). The analysis shows that the country needs to move to a better healthy routine. The overdependence of the country on creature fat is a reason for concern.

Table 2: Comparing the Eat Lancet recommended diet to the diet of Bangladesh, Vietnam, Nepal and Bhutan.

Country	Food group	Eat Lancet recommendation (%)	Percentage calorie share in the diet of Bangladesh
Bangladesh	Whole grains	32.4%	69.0%
	Plant based protein	23.0%	2.0%
	Animal source protein	6.0%	5.0%
	Fruits	5.0%	1.0%
	All vegetables	3.1%	4.0%
	Tubers/ starchy vegetables	1.6%	4.0%
	Dairy products	6.1%	2.0%
	Added Fats	18.0%	11.0%
	Sweeteners	4.8%	3.0%
Vietnam	Whole grains	32.4%	>40%
	Total protein consumption	29.0%	13.0%
	Animal source protein	6.0%	20.0%
	Fruits and vegetables	5.0%	6.6%
	Added fats	6.1%	2.6%
	Sweeteners	5.0%	3.3%
Nepal	Whole grains	32.4%	76.0%
	Plant based protein	23.0%	5.0%
	Animal source protein	6.0%	2.0%
	Fruits	5.0%	3.0%
	All vegetables	3.1%	1.0%
	Tubers/ starchy vegetables	1.6%	3.0%
	Dairy products	6.1%	4.0%
	Added Fats	18.0%	1.0%
	All Sweeteners	5.0%	4.0%
Bhutan	Whole grains	32.4%	20.4%
	Plant based protein	23.0%	9.0%
	Animal source protein	6.0%	6.0%
	Fruits and vegetables	5.0%	24.0%
	Dairy products	6.1%	-
	All Sweeteners	5.0%	3.2%

Data Source: Bangladesh Integrated Survey (BIHS), International Food Policy Research Institute (IFPRI), January to May 2015. Sample size -6435 rural households of Bangladesh consisting of around 257 food items consumed for a period of one week.

Data Source: Vietnam Household Standards Survey (2016), conducted throughout Vietnam. The survey had a sample size of 46,995 households and represented samples from all levels (rural, urban, provincial levels) consisting of 67 food items.

Data Source: Nepal Annual Household Survey 2015-16 report (AHS 2015-16). The paper gives average per capita consumption of 58 different food products for both rural and urban families, based on a survey of 4500 households from both rural and urban Nepal.

Data Source: Bhutan Living Standard Survey (BLSS) 2017, National Statistics Bureau (NSB). The absolute number of assessed families in Bhutan is 164,011. Out of these, 36% are in urban regions and 64% in rural regions. The BLSS 2017 included 11,660 families with 48,639 people.

Framework for sustainable and healthy diets in Asia

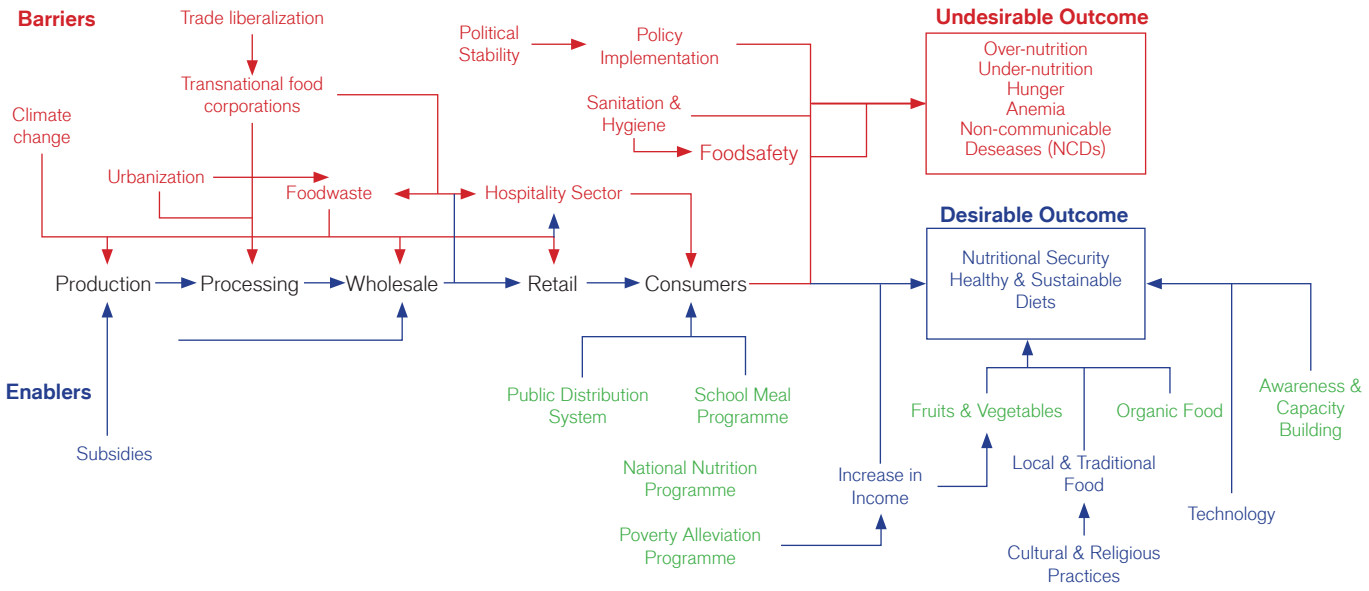

Figure 5: Framework for shifting towards healthy and sustainable diets in Asia.
Red coloured factors are barriers;
Green coloured factors are enablers;
Blue coloured factors can be both enablers as well as barriers.

3.6 Conclusion

Research has indicated that policies play an important role in influencing the eating habits of the people. High subsidies offered by the governments in countries like Bangladesh and Nepal on wheat and rice have led to thier increased consumption in these countries (Choudhary and Kishore, 2019). Very high rice consumption in Vietnam can be attributed to the policies of the government which paves way for a strong institutional structure for rice cultivation (Giesecke, 2013). The government of Vietnam has launched irrigation programs to ensure sufficient access to water for paddy cultivation. In Bhutan, over the period of years the government has encouraged dairy farming, and has also launched several rural development projects, which has led to increased consumption of dairy products in the country (Choden et al., 2017). The analysis of the countries in South Asia reveals that the dietary pattern in these countries differs significantly from the targets of the Eat Lancet diet. Eat Lancet standards however do not consider the cost or the affordability of the diet, which is in itself a major challenge for most of the countries in South Asia.

The following chapters from Chapter 4 to 9 examine various aspects of sustainable consumption practices such as the consumption of organic food, neglected underutilized food, nutrition programmes etc.

CHAPTER 4

4. Nutrition Programme in Asia

4.1. Overview

The availability of food alone does not guarantee good nutrition in today's surplus producing global regime. Malnutrition is present at very high levels globally also nations have made some but very slow the progress towards achievement of the global nutrition goals. Around 60 countries around the globe are on course towards achieving the targets of reducing wasting and stunting, and 35 countries are progressing towards achieving breastfeeding targets globally. But there is very less progress in reduction of anaemia in women of reproductive age and low birth weight worldwide (WHO, 2021). Looking more closely at South Asia, it is alarming to see that anaemia alleviation progress is worsening and no country is on track to achieve the global targets. Only a few countries are on the course of progress towards reducing wasting and stunting. There have been only some progress in tackling low birth weight. Eastern Asia has shown modest progress with all countries progressing well towards reducing stunting and the majority of countries on course with reducing wasting, but like east Asia, all countries are behind on tackling anaemia.

These trends prompt the need for a close-up investigation into the nutrition programme of the nations in these regions to see what has worked, what has failed, the structure of programme, their drivers, what factor enable their implementation and what persists as challenges and barriers. It also helps us to understand how several combinations of schemes related and unrelated to nutrition come together to play a role in creating behavioural changes and approaches towards consumption of nutritious food and availing of health services provided by schemes.

4.1.1. India

According to the Global Nutrition Report 2020, 53.4% of India's children under the age of 5 are subject to wasting, stunting, obesity or combinations of stunting and wasting or obesity and stunting. The National Family Health Survey India (2015-2016) reports a rise in obesity, stunting and wasting among its under- five population. Obesity has risen from 1.9% (2006) to 2.4% (2015-2016) while stunting and wasting are at 38% and 25%, which are above the global averages for developing countries of 25% and 8.9% (NFHS 2015-2016). There is a huge variation within the country from district to district (**Figure 6**), but overall, the stunting percentage crosses 40% in 40% of the districts in India. Obesity has risen not only among children but also among adult men to 18.9% and adult women to 20.7%, leading to India bearing the double burden of malnutrition and obesity (Menon, Mani & Nguyen, 2017). We have seen a decrease in the percentage of underweight children from 42.5% in 2005 to 35.7% in 2015-2016 (CNNS 2016-18).

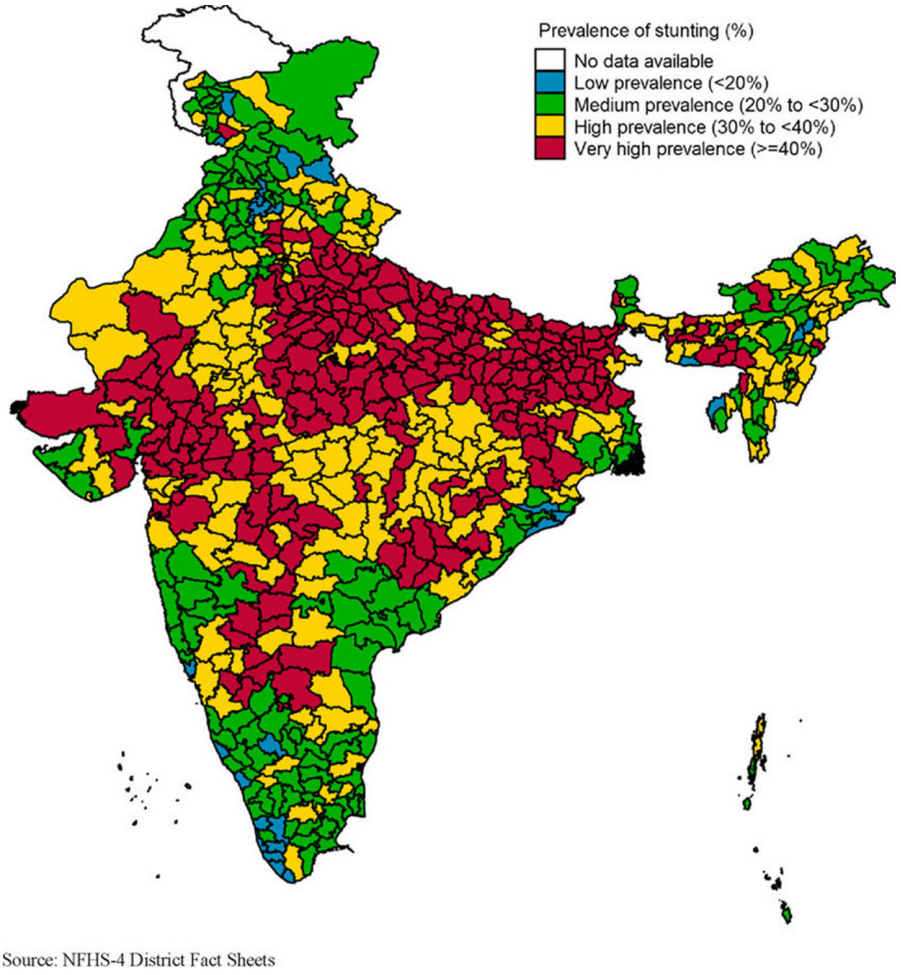

Figure 6. Prevalence of stunting in children below the age of 5, district-wise in India. Map Source: Menon et al., 2018.

The oldest nutritional policy scheme in India was the Integrated Child Development Services (ICDS) which came into action in 1975, integrating the national nutritional, educational and health requirements via check-ups, immunization, supplements etc. through Anganwadi Centres. The Midday Meal Scheme dates back to the 1920s, aimed at providing fresh hot meals to children in schools transforming enrolment, retention and attendance in schools along with their nutritional status. Several of today's schemes including the POSHAN Abhiyaan, the Pradhan Mantri Matru Vandana Yojana, Anganwadi Service Scheme Adolescent Girls Scheme etc. are beneath the ICDS. The POSHAN Abhiyaan Scheme is aimed to improvise the nutrition status of children, breastfeeding mothers and women who are pregnant. It was launched in 2018 as India's flagship nutrition programme using a multi-pronged approach to tackle and reduce stunting, underweight and low birth weight by 2% and anaemia among children and young females by 3% (NITI Aayog, 2020). Figure 7 represents the key targets of the scheme. The main focus areas are reducing of stunting by 6% with a rate of 2% per annum, reducing underweight in children by 6% at the rate of 2% per annum, reducing anaemia in children by 9% at the rate of 3% per annum, reducing anaemia in women and adolescent girls by 9% at the rate of 3% per annum and also reduce low birth weight by 6% at the rate of 2% per annum.

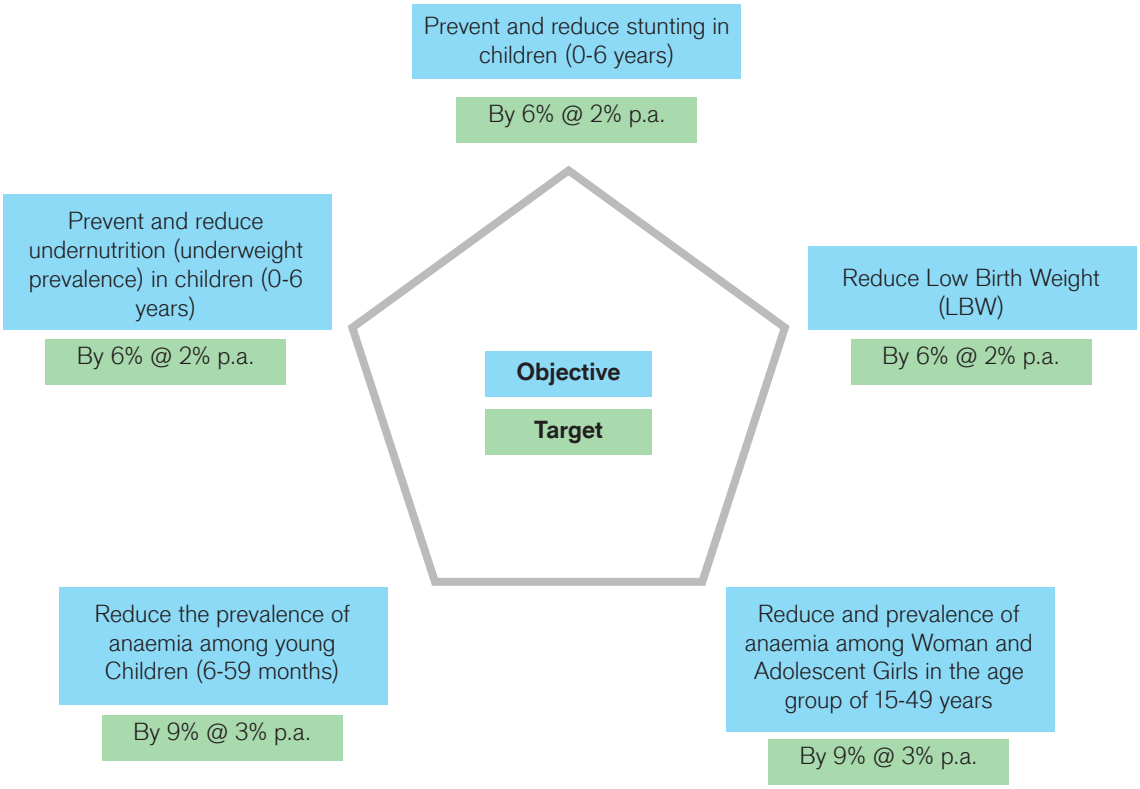

Figure 7: Targets of POSHAN Abhiyaan.

India's 2030 SDG targets of ensuring access of poor and vulnerable persons including infants to nutritious food throughout the year as well as ending malnutrition of all forms is in direct alignment with the goal of the POSHAN Abhiyaan. Also, the programme intends to help India achieve the international target of reducing stunting and wasting of children below 5 years of age and addressing the nutrition requirements of adolescent girls, pregnant and lactating people and older persons by 2025. Odisha, Chhattisgarh, Gujarat and Tamil Nadu can be called the exemplar states of the POSHAN Abhiyaan mission and these states successfully reduced malnutrition levels from 2006 to 2016 (Menon et al., 2017; **Figure 8**).

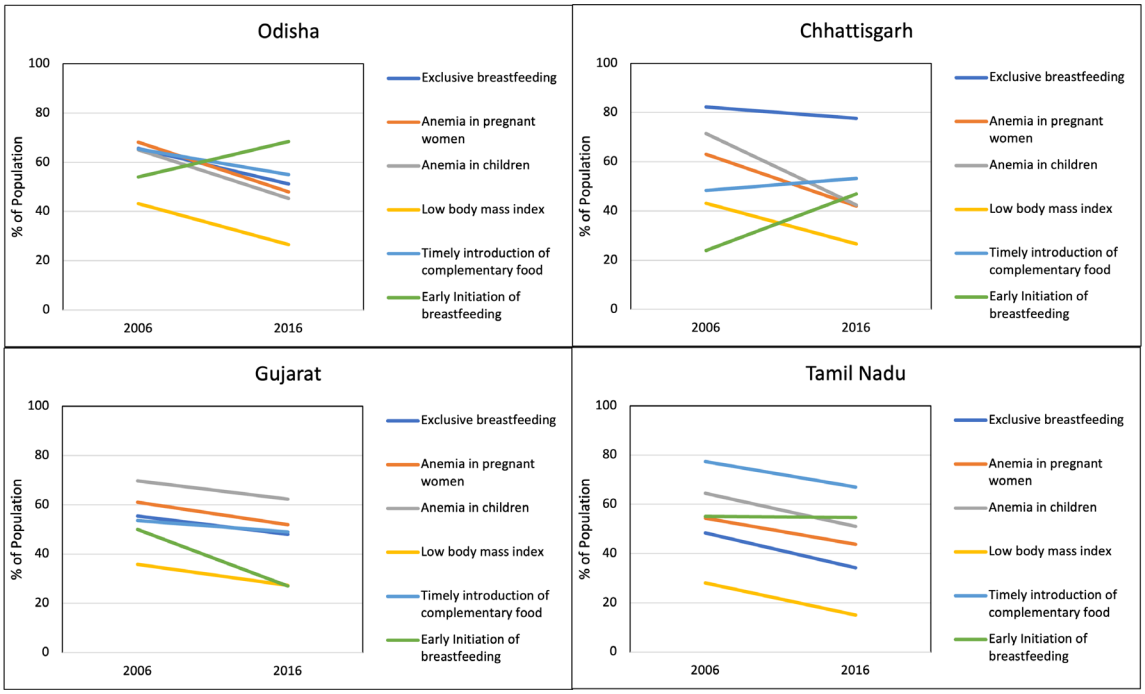

Figure 8: Changes in immediate determinants of nutrition in Odisha, Chhattisgarh, Gujarat and Tamil Nadu.
Source: (NFHS-4 data; MoHFW, 2019)

4.1.2. Nepal

Nepal is considered as one of the poorest countries in the world with a GDP per capita of $1,155 in the year 2020 (World Bank, 2020). With the malnutrition rate for children under the age of five at 43% (2019), it has one of the highest incidences of malnutrition in children in the world (The Borgen Project, 2021). In Nepal , 18% of the women fall under the category of malnourished and 35% are anaemic posing a threat to women's physical, mental, and social well-being. "Protein-energy malnutrition, iodine deficiency diseases, iron deficiency anaemia, and vitamin A deficiency are the most common types of malnutrition in Nepal", which also is a cause of weak immunity leading to various diseases. There is a strong interrelationship between the nutritional deficiency and dietary patterns which are caused by various underlying factors within the communities in Nepal (Dekota et al., 2015; **Figure 9**).

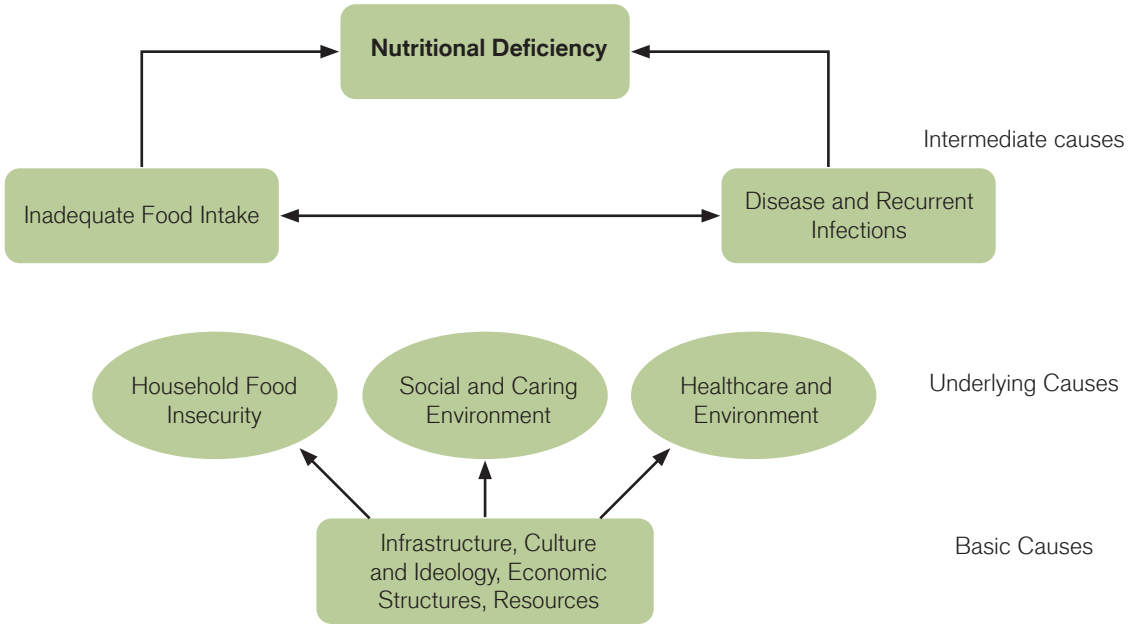

Figure 9: Interrelation between nutritional deficiencies and thier causes for Nepal.
Adapted from: (Dekota et al., 2015)

The Government of Nepal has developed policies and strategies for food security in the country some of which include, (i) Agriculture Development Strategy (ADS), [2015-2035]; (ii) Multi- sector Nutrition Plan (MSNP) I [2013-2017] & II [2018-2022], (iii) NeKSAP: Nepal Food Security Monitoring System, and (iv) Agriculture and Food Security Project (AFSP) [2013-2018]. The MSNP I was implemented in 28 districts of Nepal with the main aim to decrease the prevalence of stunting. During the implementation of MSNP I there was long term impacts such as reduction in chronic malnutrition from 40.3% (2011) to 12% (2017). The country was able to achieve a number of these targets and even though some targets were not achieved but progress has been made which suggests the impact of MNSP in improving the nutritional status of people in Nepal.

The MSNP II incorporates three major objectives and promote nutrition-specific service access and utilization. MSNP II's mission is to improve the Nation's nutritional status by improving maternal, adolescent, and children's health so that it will contribute towards human capital and socioeconomic development (**Table 3**). Interventions in various sectors such as health, education, women, children and social welfare, water supply, sanitation and hygiene, agricultural development and livestock development are made to get the desired outcomes which are specific to nutrition, sensitive to nutrition and should be enabling environment (GoN, 2017).

Table 3: Framework of MSNP -II's results of the impact on maternal, adolescents and child nutrition.

Result of Indicator	Baseline 2016	Target				
		2018	2019	2020	2021	2022
Prevalence of stunting among under 5 years children reduced	36 (DHS 2016)	34	31	31	29	28
Prevalence of wasting among under 5 years children reduced	10 (DHS 2016)	9.5	9	8	7	7
Prevalence of low birth weight reduced	24 (MICS 2014)	20	17	13	11	10
% Reduction in children under five with overweight and obesity	2.1 (DHS 2016)	2	1.9	1.7	1.6	1.4
% Reduction in WRA overweight and obesity	22 (DHS 2016)	22	21	20	19	18
% Of women with chronic energy deficiency reduced	17 (DHS 2016)			12		11

4.1.3. Thailand

Thailand has worked endlessly to fight undernutrition and hunger through various strategies, policies and investments tailored to reduce trends in under-nutrition. These efforts coupled with awareness drives and capacity building increased the need for a nutrition programme and subsequently the need to integrate nutritional objectives into the national plan since the 1960s. It took efforts to integrate nutrition into national strategies in Thailand starting from phase 1 (1960-1976) of the National Food and Nutritional Plan. Accordingly in the year 1982, under-nutrition was declared as a symptom of Poverty, following which the Poverty Alleviation Programme (PAP) was created. This programme covered half of the country and the districts which were considered poor and a multi- sectoral approach was taken in by the National Nutrition Committee which involved members of the health, agriculture, education and rural administration, academic and planning sector. Since the 1990s the country has seen a steady increase in nutritional status with decline in child stunting, underweight and wasting (**Figure 10(a)**). Albeit these changes, the country has witnessed an increase in the problem of overweight in adults; 26% of male and 33% of women are over-weight (WHO, 2017) (**Figure 10(b)**).

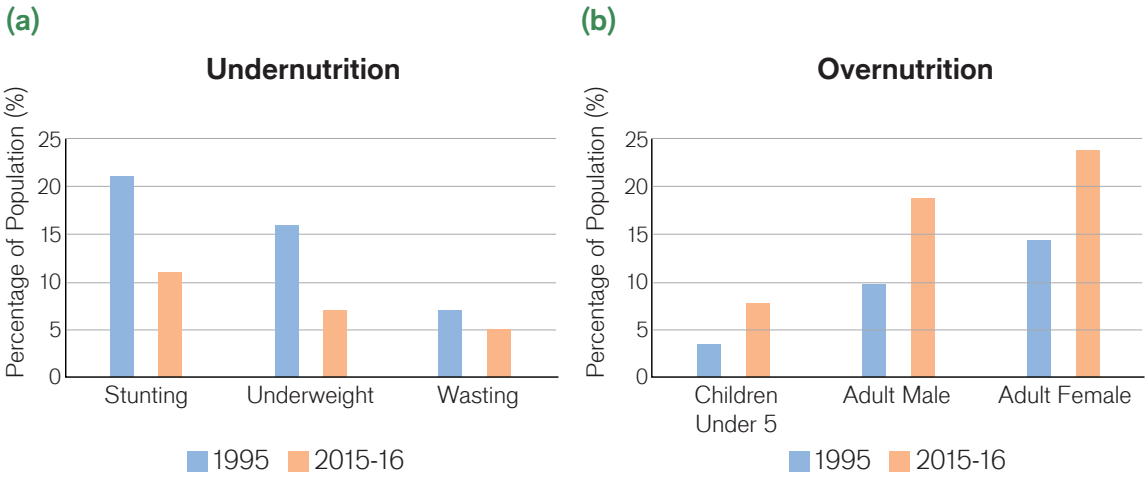

Figure 10: Prevalence of malnutrition in Thailand; (a) under-5 wasting, underweight, anaemia and stunting, (b) Overweight and obesity.
Source: (FAO 2017)

4.1.4. Indonesia

Indonesia has been facing a double burden of under-nutrition and over-nutrition and has some concerning statistics for nutrition in the world. The reports for 2018 show that under the age group of five years 3 in 10 were stunted (UNICEF, Indonesia). As a result of this more than 2 million children under the age of five are malnourished (Nutrition international). Emerging changes in Indonesia's nutritional status, particularly among youngsters, are concerning. Underweight prevalence climbed from 18.4% in 2007 to 19.6% in 2013, while stunting prevalence increased from 36.8% in 2007 to 37.2% in 2013. Furthermore, if the prevalence of stunting among under-5-year-old children is between 30% and 39%, the condition is deemed severe and if it is 40% or more, the condition is considered critical (**Figure 11**).

The policies for food and nutrition in Indonesia incorporate regional and international commitments and initiatives such as the Millennium Development Goals (MDGs), integrated food security framework, scaling up nutrition (SUN) and the zero-hunger challenge. An examination of the national initiatives of the National Plan of Action for Food and Nutrition (NPA-FN) from 2006 to 2010 sparked the formulation of the "National Plan of Action for Food and Nutrition (2011 to 2015)". Significant advancements have been made in community nutrition, accessibility of food, quality and safety of food, clean and healthy lifestyle and synchronization of food and nutrition institutions.

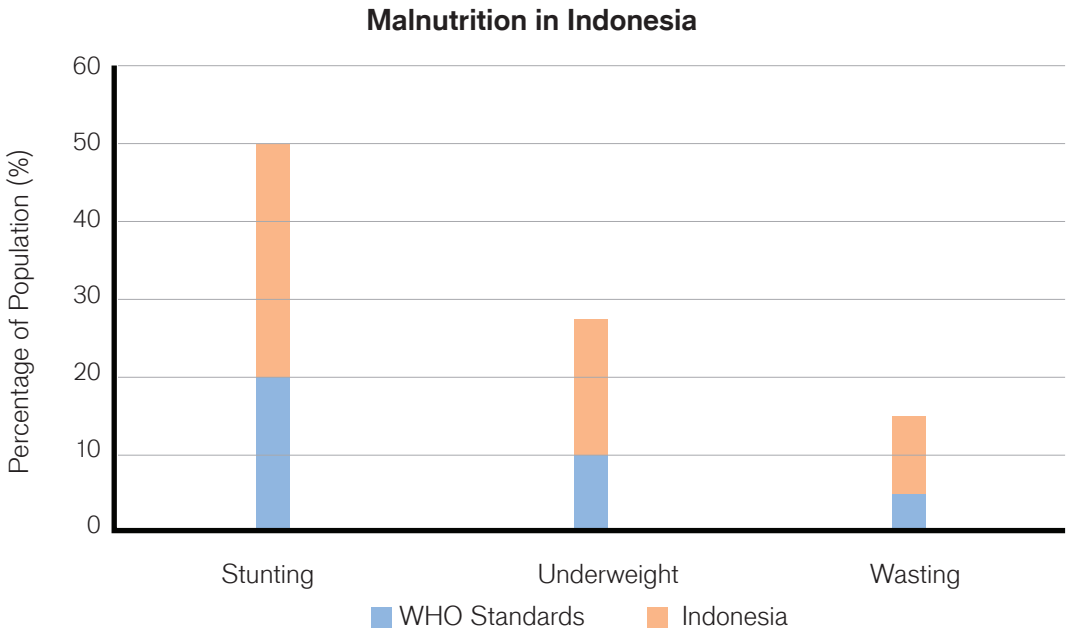

Figure 11: Prevalence of Malnutrition in Indonesia.
Source: (Basic Health Research (Riskesdas) 2018, Ministry of Health (2019), Ahmad et al., 2021)

The objectives of NPA-FN include a) to recognize the value of food and nutrition as a development investment; b) to be able to analyse the state of food and nutrition development in every area in order to determine priority steps, be specific to adequate and cost-effective initiatives, reinvigorate food and nutrition institutions, and monitor and evaluate food and nutrition programmes; and c) to enhance integrated coordination of food and nutrition actions. (National Development Planning Agency, year).

4.2. Barriers

The nutrition programme across Asia as we have discussed above brought changes to the nutritional status in the countries and in the region of Asia as a whole, but there is still a long way to go to achieve the target of nutrition for all. Effective policy implementation requires a stable platform and monitoring, to become a success, but all the regions have their own restrictions while implementing the programme and policies, especially in the developing countries where the majority of the population is from a low-income household and the socio-economic conditions are not static. In terms of policy, the major challenges faced by any nutritional programme is the lack in implementation strategies by the government due to lack of communication, awareness campaigns, digital illiteracy and the existing gender stigma. For example, in the case of India, anganwadis which are the point of contact for almost all government schemes have very little time for the implementation of the ICDS activities. Also, the lack of upgradation of physical infrastructure of the Anganwadi Centres is a challenge to their operations and convergence. This is also followed by inappropriate use of the funds allotted by the Gram Panchayats. Also, the increased reliance on digital tools and platforms has made it challenging for the on-field workers to learn and update their knowledge and skills to use them and deliver services. There is also a lack of training due to too many sessions, large batch size, lack of monitoring tools and reduced participation of the health department. In certain regions the socio-economic conditions and political situations also are the challenge for not only implementation but the adaptation of the such programme as political conflicts overpower even the basic nutritional requirements of the country, e.g., Nepal's progress was severely hampered by a decade-long armed conflict. One of the country's major concerns is managing political change. Further, there is uncertainty about the decentralization process, which is critical for establishing multi-sector approaches. The major barriers faced in Nepal's MSNP-I (2013-2017) include disparities where poor rural dwellers find it difficult to improve their nutritional status due to huge gaps in access to appropriate nutrition and high-quality health care between those living in urban and rural areas, as well as between the wealthiest and poorest people.

Another barrier is the delivery of health services where the communities most vulnerable to malnutrition are sometimes hampered by poor quality health care. Challenges like traditional food practices where inappropriate food and social habits obstruct the proper intake of nutrients for mothers and children, as well as their care. This was one of the reasons for the slow progress in raising awareness and protecting mothers and children, as well as eradicating child marriage and dangerous eating practices during menstruation and pregnancy (National Planning Commission, 2017).

In Indonesia, the Devan Ketahanan Pangan (DKP)/ Food Security Council chaired by the President devises policies that take care of the nutrition and food security in Indonesia. The

operations of the DKP are controlled by the Ministry of Agriculture and its unit called the BKP which carries out the overall development, assessment and monitoring of policies. In every province, there is either a governing structure like the DKP or local BKPs or sometimes, even private agencies that carry out the implementation. Some of the barriers in managing food security in Indonesia stem from the coordination within the DKP. With its limited capacity to convene only twice a year, and mostly chaired by persons other than the declared chairman, cross- sector coordination becomes an issue. Also, the focus falls on production and nutrition and food access remain problems that get side-lined. Apart from the political angle, the programme also lacks the required coverage as well as nutrition-sensitivity. There is a dearth of qualified individuals, but there is a lack in quality of the monitoring systems. There is not enough focus on behaviour change in the policy programmeand also lack of strong institutions and governing bodies.

Apart from these barriers, the technological barriers due to lack of digital knowledge are also a problem for the major Asian countries. Another barrier is the funding and grants and their distribution at all levels, national, district and local, the ethical constraints like corruption, and mismanagement of resources and grants also does weakens the roadmap of policymaking and implementation.

4.3. Enablers

As we discuss the successful implementation of policies and various nutritional programme across Asia, it is very important to look at the various enablers that have made the programme successful in their respective regions, so that not only each of the countries can learn from each other but also it will also be beneficial for the designing and implementation of upcoming programme and policies. The enablers can be divided into policy, technology, business in terms of the food value chain, market role etc, and capacity building.

4.3.1. Policy

Nutrition is also linked to the accessibility and improvement of water and sanitation and hygiene which has made it easy for the countries across Asia in reducing stunting especially in children (Spears and Haddad, 2015). Policymaking should be wholesome and flexible as per the need of the region, so it could complement the other areas of development along with nutrition in an integrated manner. For example, in Thailand, according to the *'Village Health and Sanitation Project'* in the 1960s played an important role in providing safe and clean water and sanitation. The access to clean water and sanitation increased to 96% from 86% for the year 1990-2012. The scene of disparity existed where rural areas had better access than urban areas with a percentage of 96% and 89% respectively. And this was taken care of according to report by FAO 2014, where urban areas have 97% access to WASH and rural areas 95%, which eventually brought a great success to the nutrition levels of Thailand. The PAP program in Thailand was a success due to its stringent planning, by following the BMN approach (Basic Minimum Need) planning the micro and macro levels were taken. There was a list of 32 indicators in 8 identified areas, the first indicator to be selected was the nutrition and health and other parameters included low-birth weight, portable water, sanitation services etc. There were many stakeholders involved at the micro level like the community leader's teams, health and nutrition experts, officials, NGOs, etc. At the micro-level the Government of the country, the health professionals, and the agencies located internationally to look after these community processes with help from the agriculture sector, the education department, the rural development authorities etc.

4.3.2. Technology

The advancement and incorporation of technology is a highly important factor for the success and wider outreach of any policy or nutritional programme or approach. The technological advancement could be in terms of research and development, biotechnology, digital literacy, digital advancement, providing the online platforms etc. For example, in Thailand, the fortification of food has been a major driver for the elimination of under-nutrition especially in the reduction of micronutrient deficiencies. The process of fortification started off as a voluntary case but in the year 1993, the National Food Fortification Committee started fortifying iron in food items like wheat for noodles and bread also in fish and soy sauce (Tontisirin, 1998). The country also collaborated with various stakeholders and the World Food Programme on the fortification of rice which was successful (WFP & Govt of Odisha, 2017).

4.3.3. Business

Markets and food value chains are important links for the betterment of consumption and outreach of the nutritional programme. For the scheme of Poshan Abhiyan in India, few states follow a decentralized model, which has the benefits of women empowerment, local production and procurement, income generation and community ownership opportunities, but come with a limit in quality control, high production charges and fortification. Tamil Nadu's innovation using private- cooperative partnership and Telangana's dedicated nutrition- production centres are models for other states in solving the challenges in reach and consumption of the THRs (NITI Aayog, 2020).

Box 1: Case study

Multi Sector Nutrition Plan (MSNP) -Nepal

This nutrition plan uses a multi-sector strategy to handle the difficulties of nutrition in a comprehensive and organized manner. The goal of this plan is to enhance maternal, infant, adolescent nutrition by upgrading approaches that are specific to nutrition and fostering a nutrition friendly environment (NPC, 2017). During the implementation of MSNP there were long term impacts where studies showed that there was reduction in chronic malnutrition to 12% which was initially 40.5%. With UNICEF's assistance, bottom-up planning in both nutrition-specific and nutrition sensitive regions has started There has been progress in the Multi-Sector Nutrition Plant II (MSNP II) from the year 2018 to 2022 incorporates three major objectives and that are to promotes nutrition specific service access and utilization by increasing the number of service delivery institutions, improving health-related behaviour by increasing access to and usage of services that are sensitive to nutrition, improving federal, regional, and policies of municipal govt., programme, and cooperation by several sectors to provide an enabling environment for better nutrition.

i. Barriers: *The major barriers faced in MSNP include disparities where poor rural dwellers find it difficult to improve their nutritional status due to huge gaps in access to appropriate nutrition and high-quality health care between those living in urban and rural areas, as well as between the wealthiest and poorest people. Another barrier is the delivery of health services where the communities most vulnerable to malnutrition is sometimes hampered by poor quality health care. Other challenges include deterioration in the quality of the training due to too many sessions, large batch size, lack of monitoring tools and reduced participation of the health department.*

ii.Enablers: *Policy has played as a major enabler for this programme: Policy: The MSNP was introduced by the National Planning Commission (NPC) in close collaboration with the five other Ministries, namely the Ministry of Health and Population (MoHP), Ministry of Agriculture Development (MoAD), Ministry of Federal Affairs and Local Development (MoFALD), Ministry of Education (MoE), and the Ministry of Urban Development (MoUD) making it a holistic and integrated scheme. The Government has brought big change by introducing the programme and dividing into phases as per the current needs and development required for successful implementation of the scheme and its better reachability. Allocation of sufficient funds, participation of public and international organizations like UNICEF, FAO are enablers for the MSNP scheme which helped in attracting a lot of people to provide funds or help in their capacity in terms of training, guidance, food etc.*

To read more: *https://un.org.np/sites/default/files/doc_publication/multisectoral-nutrition-programs.pdf*

Box 2: Case study

Poshan Abhiyaan-India

POSHAN Abhiyaan is India's ambitious flagship nutrition programme aimed at improving the nutrition status of children, breastfeeding mothers and pregnant women for tackling stunting, low birth weight, anaemia and underweight conditions. The scheme focuses on cross- sectoral convergence of departments and schemes with the help of technology and grass- root level interventions and bring behavioural change to eradicate malnutrition by making sure that care and nutrition are given to mother and child during the first 1000 days of the birth including pre- and post- birth period. ANMs (Auxiliary Nurse Midwifery), ASHA (Accredited Social Health Activist) and AWW (Anganwadi Workers) are the frontline workers who visit home to provide service and monitor the progress in the scheme. The scheme has helped in improving the nutritional status of the country.

Barriers: To combat issues under malnutrition like stunting and wasting the government provides these centres with "Purakh Poshan" that comprises commodities like wheat, lentils, and rice. The nutrition kits provided to children in the high burdened districts should be given to every child regardless of the nutrition status of the district. Lack of human resources as many states have shortages in the roles of supervisory cadres including Lady Supervisors, CDPOs, and DPOs.

Enablers: The implementation of schemes like Pradhan Mantri Matru Vandana Yojna, the Poshan Abhiyan scheme has provisions of providing cash incentives of worth Rs 6000/- which gets delivered to the pregnant women in instalments of Rs 2000/- and this leads to inclination towards healthy lifestyle and an enabler for the scheme.

i. **Policy:** *Convergence Action Plan Committees at the state, block and district levels conduct the multi- sectoral planning and implementation of the scheme. They ensure the convergent approach required for tackling malnutrition.*

ii. **Technology:** *There is much digitization done in terms that, Anganwadi Workers are provided with smartphones and Growth Monitoring Devices such as Infantometer, Stadiometer and Weighing Scales for monitoring the growth of infants.*

iii. **Awareness and Capacity Building:** *Resource groups are in charge of the Incremental Learning Approach training at different levels for capacity building of frontline workers. Goodwill Ambassadors help promote the important messages on nutrition to communities for the improvement of status of nutrition of states. Celebrities and influencers help promote the various movements such as Jan Andolan, sarpanches are present to spread awareness on healthy nutrition practices as mentioned by the Anganwadi Supervisor, which has an immense impact on mindset of people and their food choices and healthy lifestyle.*

To read more: http://poshanabhiyaan.gov.in/

4.3.4. Capacity Building and Awareness

To eliminate malnutrition agriculture played an important role. For production and support special efforts were put forward, including supplementary food for pregnant women and making a network for community-based free food for infants and the younger ones through an active participation. E.g., the policy initiative of Thailand, which has helped the country eliminate severe underweight issues related to children. It has been also extended into the School Lunch program and school milk program (Tontisirin et al., 2014). In India, it can be seen that in Chhattisgarh and Odisha, Maternal New-born and Child Health (MNCH) interventions have contributed a huge part to the reduction. In Tamil Nadu, an increase in wealth and maternal education contributed the most to the reduction of stunting. Service delivery during nutrition days and community events like village health, sanitation and nutrition days and community- based events such as Annaprasan Diwas and Godhbharai Diwas became platforms for distribution of supplements, vaccinations, immunizations, awareness creation, check-ups and counselling does help with capacity building and awareness for the better outreach of the programs.

The link between the low rate of stunting and the importance of a mother's education cannot be ignored (Semba et al 2008). In the year 2012, the enrolment ratio for secondary education in Thailand increased to 87% in 2012 (World Bank 2012). There was a significant increase in female education in Thailand from 81% in 2008 to 89% in 2012.

4.4. Conclusion

This chapter gives an insight into the nutritional status of the countries in South and Eastern Asia. Through looking at the nutritional policies of India, Nepal, Thailand and Indonesia, we were able to gauge the crucial role played by these programme in the respective nations' nutrition agenda and their success. That being said, nutritional deficiencies, stunting and wasting continue to be a major public health issue in almost a third of the regions' countries. The decreasing trends in the above-mentioned regions are evident but more emphasis and work has to be put on all areas. With better nutrition and health status of the countries, the countries will be able to perform better in all aspects of life and the countries doing better is helping us reach our 2030 SDGs of Zero Hunger, No Poverty, Reduced Inequalities, Good Health and Well-being, Access to clean and safe drinking water, decent work and economic growth.

CHAPTER 5

5. Organic Food

5.1. Overview

Organic food is defined as the category of product that has been cultivated by complying with various regulations, frameworks, and certifications that aim at maintaining ecological balance, protecting biodiversity and cycle resources. This involves the complete non-usage of synthetic fertilizers and pesticides. Within the purview of food security, organic food plays an important role as it increases accessibility to healthy, pesticide-free and sustainably produced food. A study by Lairon (2010) found that vegetables and fruits cultivated by organic regulations have about 50% fewer nitrates in them when compared to their non-organic counterparts. It also contains more antioxidants, and about 94-100% of the organic plant products do not have any pesticide residue. These statistics and facts are compelling reasons to capitalize on the capability that organic food has towards the current situation, globally. Although in many developing countries a large number of small and marginal farmers are associated with organic production however, the retail and consumption are usually linked with middle- and high-income households. The promotion of organic farming in Asia can benefit particularly the low-income households in two ways;

i. *Promotion of organic farming among the marginal and small farmers can increase their income which can provide them economic access to basic needs such as food, shelter, healthcare, children's education, etc.*

ii. *A large number of small and marginal farms in Asia especially in the remote areas and hill and mountainous regions are subsistence farmers. They are also de facto organic and a number of them still continue to grow traditional food crops at least in some parts of the crop area. In such cases promotion of organic farming or natural farming can help sustain their livelihood and also improve their nutritional security while ensuring they maintain healthy and sustainable diets.*

The Asia Pacific region is leading in terms of the organic market with a retail value of 27.9-89 USD million, which is quite good in comparison to other developing regions of the world (**Figure 12**). This reflects how rapidly the organic market has grown in the last decade and thus has an immense potential for promoting healthy and sustainable diets across Asia and shifting people towards sustainable modes of consumption as well as production.

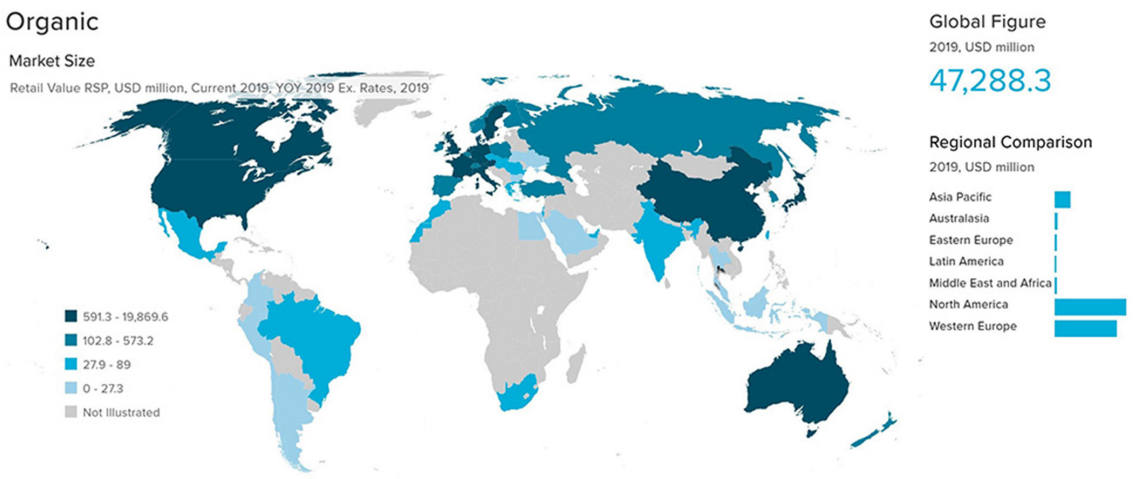

Figure 12: Map showing the market size for organic food across the world.
Source: Euromonitor International, 2020

5.1.1. Organic farming in China

In 2016, China released the Guidance on Promoting Sustainable Consumption where it specified that sustainable consumption refers to the consumption behaviour characterized by saving resources and protecting the environment. The concept of organic food was introduced in China after the reform and opening-up policy. By 2019, China's organic agriculture acreage ranked third in the world, accounting for 8% of the total acreage of global organic agriculture (Willer et al., 2021). After the year 2013 the Chinese organic agriculture has been rapidly developing, due to the laws promulgated between the year 2002 to 2013 for better implementation of the law and order in the Chinese Organic Market environment (The organic food market in China, 2020). In China, certification instruments played an important role in promoting sustainable consumption. As of 2019, 126 standards have been issued for China's green food labelling, and 31,946 products from 13,860 enterprises have obtained green food labelling (including the expired green food labelling) (Analysis of the Current Situation on Sustainable Consumption in China, Switch Asia RPAC in China, 2019).

The organic food cultivation and value chain in China are managed mostly by highly organized systems, instead of individual supply systems as prevalent in most other countries (The organic food market in China, 2020). Various models of organic food production systems exist (**Figure 13**).

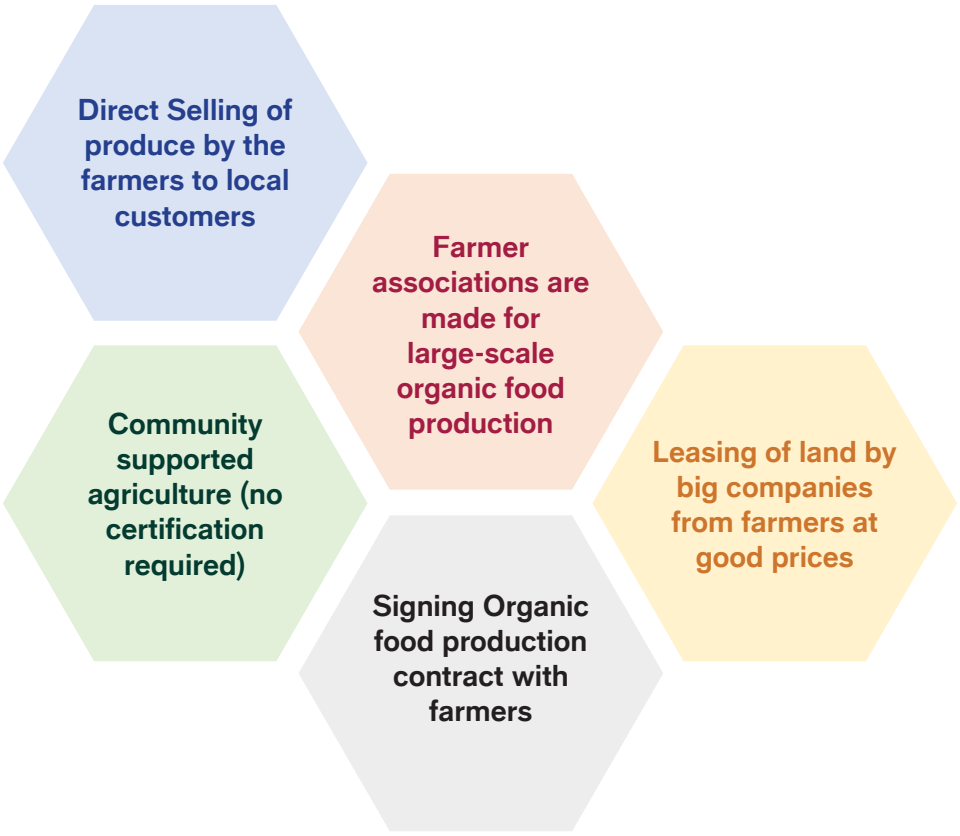

Figure 13: Organic food production models in China.
Source: (Analysis of the Current Situation on Sustainable Consumption in China, SWITCH-Asia RPAC, 2019)

According to a study conducted by International Trade Center on 204 Chinese organic consumers in Beijing and Shanghai, the top five reasons for choosing organic foods were: Enforcement of quality, Overall quality, Certification relating to quality, Food safety, Information about nutritional value (The organic food market in China, 2020). As the organic food has been promoted among the younger generations about its benefits, the organics market have seen a significant growth. As most of the mothers are working women, hence they prefer healthy, chemical free food for their babies and thus organic baby food has also seen increased demand. The forecast shows a CAGR value of 10.2% for the period 2019-2024 (Global Organic Trade Guide, 2019). Although currently the organic market caters mostly to middle- and higher-income brackets of the society, the possibility of expanding this to lower income households can be explored.

5.1.2. Organic farming in Vietnam

In Vietnam, the origin of organic food stemmed from the fact that there was an increase in the occurrence of patients with gastrointestinal cancer, which is alluded to the polishing of rice using asbestos. Further, due to the long war in the country, the soil is ridden with chemicals that leech into the food system through the soil and water the sector of organic farming in the country is gaining momentum at a slow pace. Thus, the biggest driver for the consumption of organic food in Vietnam is safety for consumption. Congruent to the reason for the birth of organic food, the Vietnamese people opt to consume organic food as a means of safe food (Mergenthaler, Weinberger & Qaim, 2009). Being one of the biggest producers of rice, tropical fruits, and tea, and the abundance of the Mekong Delta, Vietnam has the capabilities to harness the production of organic crops in a large-scale production. From a consumption perspective, Vietnam consists of consumers with high disposable income, interest in health and wellness, high quality products, and a market that is currently outpacing the local production (USDA, 2021). With a total organic area of 61,901 ha in 2019, Vietnam has had a whopping 20% increase in one year (**Table 4**). Further, it has an organic export value to the EU of 10,942 million tons annually, ranking at the 40th position, globally (FiBL, 2019).

Table 4: Indicators of organic agriculture of various crops in Vietnam (2019) (FiBl, 2019).

Crop type	Organic area (in ha)	Organic area fully converted [ha]	Organic area share [%]	Organic area under conversion [ha]
Cereals, total	1640	1263	0	377
Coconut, total	18792	13887	12	4905
Coffee, total	2120	420	0	1700
Rice	1640	1263	0	377
Tea	8896	3753	7	5143
Fruit, tropical and subtropical, total	19178	19178	7	60
Tea/mate, etc., total	8896	3753	7	5143
Vegetables, total	2057	1981	0	76

In a study conducted by Q &Me Vietnam Marketing among 400 individuals in the cities of Hanoi and Ho Chi Minh, awareness of organic food and its availability is high among the middle- and high-income individuals. Those with the awareness were between the age group of 31 and 39 years old. Even with the growth of production of organic food in Vietnam, the import market for this product would continue to be high due to the increasing demand for organic food especially by the young consumers. The safety, health and nutritional value of the organic foods were the only factors that played a role in their consumption (Truong, Yap & Ineson, 2012).

In response to the increasing market for organic food, the Vietnamese government has formulated various standards for organic production and farming (Nguyen, 2010). The organic farming practice picked up in the 1990s in Vietnam, wherein 33 out of the 63 provinces of the country practice organic farming, mainly focusing on rice, tea, vegetables and fruits, organic fisheries, and organic herbs (Organic Food in Vietnam: Why is the Ideal Country to Export, 2019). The Participatory Guarantee System (PGS) is a non-governmental certification in Vietnam that was launched in 2008. It consists of a certification board with multiple stakeholders

that certify produce as being of organic origin. The IFOAM (International Federation of Organic Agriculture Movements) defines PGS as a "low-cost, locally-based system of quality assurance with a strong emphasis on social control and knowledge building." It has successfully gained the trust of stakeholders as it involves the participation of producers (farmers), government, private sectors and consumers. The PGS focuses on mainly five provinces, which are Hanoi, Ha Nam, Phu Tho, Do Nang, and Vinh Phuc (Rikolto, 2021).

5.1.3. Organic farming in Nepal

Another example is of Nepal, where the variety of topography in the nation-state requires agricultural practices to be diverse to adapt to the different altitudes, climatic conditions, soil quality, humidity, sunlight duration etc. and yield good harvests. Despite being an agriculture-dependent country, its population statistics show variations in nourishment and nutrition accessibility. Organic agriculture was first introduced in Nepal as a priority sector in the 10th Five Years Plan. In 2019, 0.2% of the total agricultural land in Nepal was under organic practice (FiBL, 2019). However, it is estimated that 26% of agriculture in Nepal is organic in nature by default. Organic sellers claim that the demand for organic food is seeing a rise on the local level. People are becoming more aware of the nutritional and health benefits of organic products and prefer buying those (Atreya et.al, 2020). Consumer perception of organic food and willingness to buy can be linked to many internal as well as external factors which have a direct and/or indirect influence on the purchasing decision of the consumer (**Figure 14**).

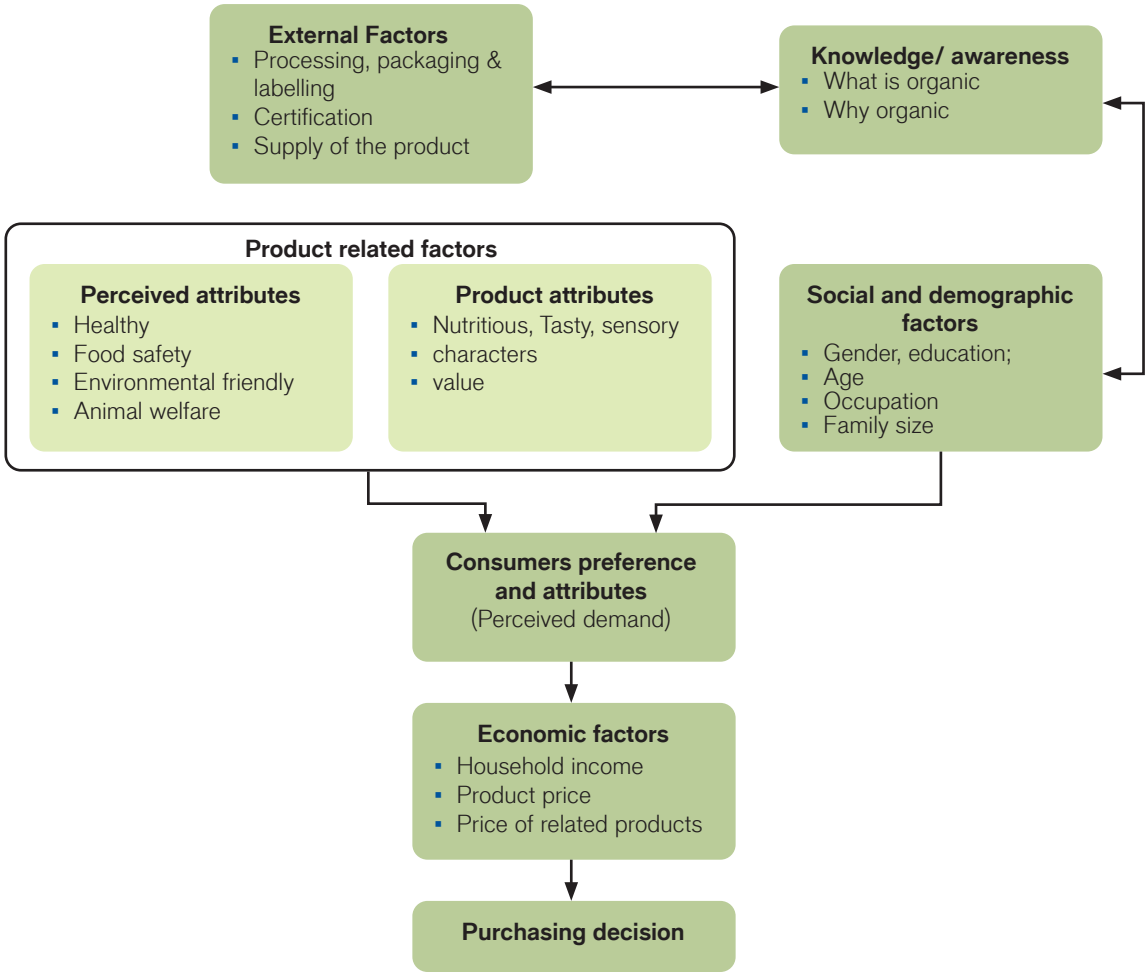

Figure 14: Framework of factors affecting organic consumers' attitudes and willingness to pay for organic products.
Source: (Aryal et al., 2009)

The newly formulated Agricultural Development Strategy (ADS), a policy-level guiding document of the country for agricultural development for the coming 20 years implemented recently, also mentions organic farming as a viable option for sustainable agriculture (ADS, 2013). The government of Nepal has set up certification institutions that are responsible to check if the organic products meet the international standards to ensure quality deliverance has been an important step in the organic movement (Atreya et.al, 2020).

5.1.4. Organic farming in Thailand

The industrialization and modernization of agricultural food production have ushered in socio-economic growth in many Southeast Asian countries, one of them is Thailand. Thailand's government is particularly focused on achieving agricultural export objectives to meet global demand. While focusing on increasing agricultural output, the Thai government is gradually recognizing the necessity to encourage organic methods for food safety in order to retain its worldwide competitiveness (Win, 2017). Organic farming in Thailand, similar to other developing nations, is based on conventional farming. This soon changed in the 1970s with the advent of techniques which brought forth the green revolution. However, these techniques faced opposition by the NGOs and farmers. This led to the formation of the Alternative Agriculture Network (AAN). AAN regained organic agricultural development back in the country as its main intention was the promotion of sustainable agriculture. Farmers were encouraged to participate in organic agricultural extension, a new market for small-scale farmers was developed, and organic agriculture standards and certification systems were put in place (Win, 2017).

According to the Organic World Report 2021, Thailand has accounted for 284,592 hectares of area for organic purposes. The organic areas have been utilized for agriculture, aquaculture, wild collection and other non-Agri purposes. Food items consist of six groups namely: rice and other grains, vegetables and fruits, alcohol and tobacco, other foods consumed at home, eggs and dairy, FAFH (Food away from home), meat and fish. Of which, the latter 3 are considered as 'luxuries', as it relates to the degree of urbanization and family income. Low-income and elderly-headed households are particularly sensitive to fluctuations in food prices and income. This indicates that individuals are suffering from a lack of proper food intake as a result of rising food prices or the economic slump (Wongmonta, 2020).

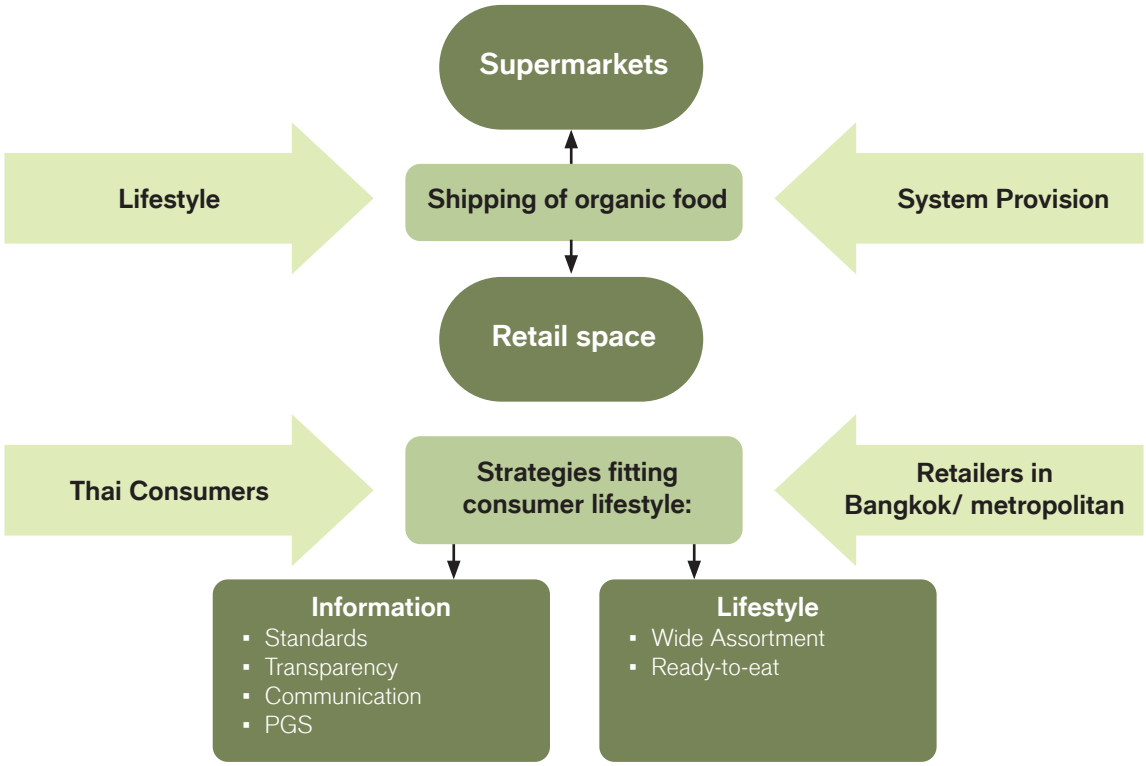

Figure 15: Thai Retailer-consumer relationships on organic food products.
Source: Kantamaturapoj, K., 2020

The majority of customers buy from local convenience stores on a regular basis and have little familiarity with alternative categories such as natural, organic, or 'safe' foods. But the willingness to pay (WTP) graduated with income and age for such products. But for the Thai government, the biggest barrier to the promotion of such products was the lack of awareness on the consumer front (Posri, Shankar, and Chadbunchachai, 2006). There is a need for stakeholders such as Supermarkets, Organic producers, Influencers and should work hand in hand to educate the consumers.

5.1.5. Organic farming in India

The organic food industry in India is driven by the increase in health awareness of food consumption and the importance given to the nutrient composition of the food. The positive aspects of both these parameters are present in organic food, giving it the edge over non-organic food. An increase in economic status, urbanization, and rising income level has allowed the growth of the organic food industry in India. As per APEDA data for 2021, the total land area with or under the process of organic certification, i.e., under the National Programme for Organic Production in India is 4.4 million ha under which 2.7 million ha is cultivable area and 1.7 million ha is for wild harvest collection. In the year 2016 Sikkim came out as a state with 100% organic production by converting its whole cultivable land into organic certification. Overall, India produced approximately 2.6 MT of certified organic products which included various varieties of food and non-edible food items (Table 5). The cultivation of sugar crops takes the lead in the organic market in India. The largest producer of organic food was Madhya Pradesh, followed by Maharashtra, Rajasthan, and Uttar Pradesh (Chandra & Rosmann, 2020). The highest producer of organic products in India is Madhya Pradesh followed by Maharashtra, Karnataka, Rajasthan and Uttar Pradesh (APEDA, 2021). In the last few decades India has shown a great progress in terms of organic

food production, certification and with the increasing level of nutritional awareness among the people has also improved the consumption and demand for the organic food (Magnusson et al., 2003).

A study conducted by Chattopadhyay and Kanzode (2019) analysed the organic food consumption patterns of 105 individuals from the city of Bengaluru, India. This consumption pattern was segmented across different variables such as age, educational qualification, socio-economic status, etc. Of this, the income level in correlation with the consumption of organic foods is of interest in the current study (**Figure 16**). The Government of India has started an array of schemes and agricultural policies in an attempt to kickstart and promote organic agriculture among farmers (**Figure 17**).

Table 5: Production of organic crops in India (2018-2019).

Crop Category	Farm Production (MT)		
	Organic	In Conversion	Total
Sugar crops	984730	6910	991640
Oil seeds	727148	8	727156
Fibre crops	312945	888	313833
Cereals & Millets	269547	187	269734
Pulses	71875	0	71875
Plantation Crops (tea/coffee/coconut)	61321	224	61544
Spices and Condiments	56208	45	56253
Medicinal/Herbal/Aromatic Plants	48424	1	48425
Fruits	35813	2	35815
Flowers	11016	0	11016
Dry fruits	8834	30	8864
Vegetables	7134	1	7135
Miscellaneous	1964	0	1964
Fodder seeds/Crops	1851	0	1851
Tuber Crops	289	0	289
Total certified production	2599099	8297	2607396

Source: APEDA (2019)

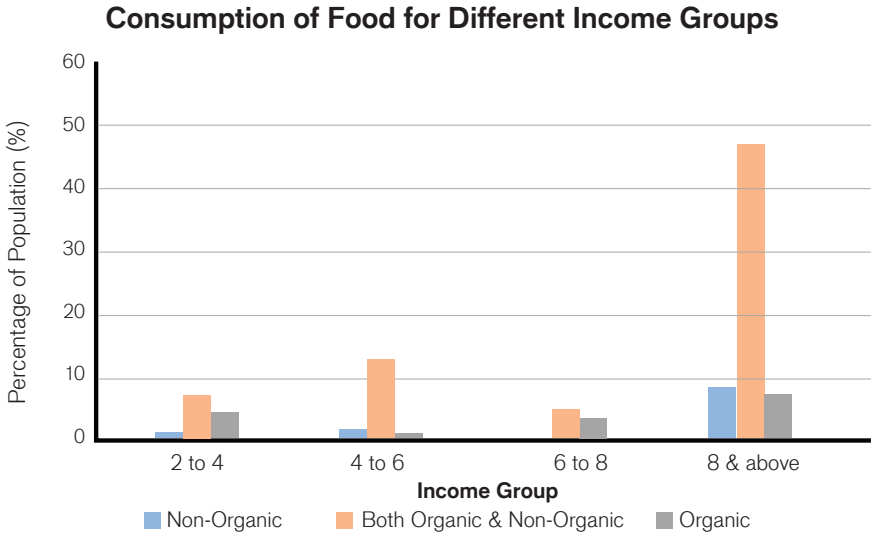

Figure 16: Consumption of various food types for different income groups. 2 to 4 (Lakhs INR); 4 to 6 (Lakhs INR); 6 to 8 (Lakhs INR); 8& anove (Lakhs INR).
Source: Chattopadhyay and Kanzode (2019)

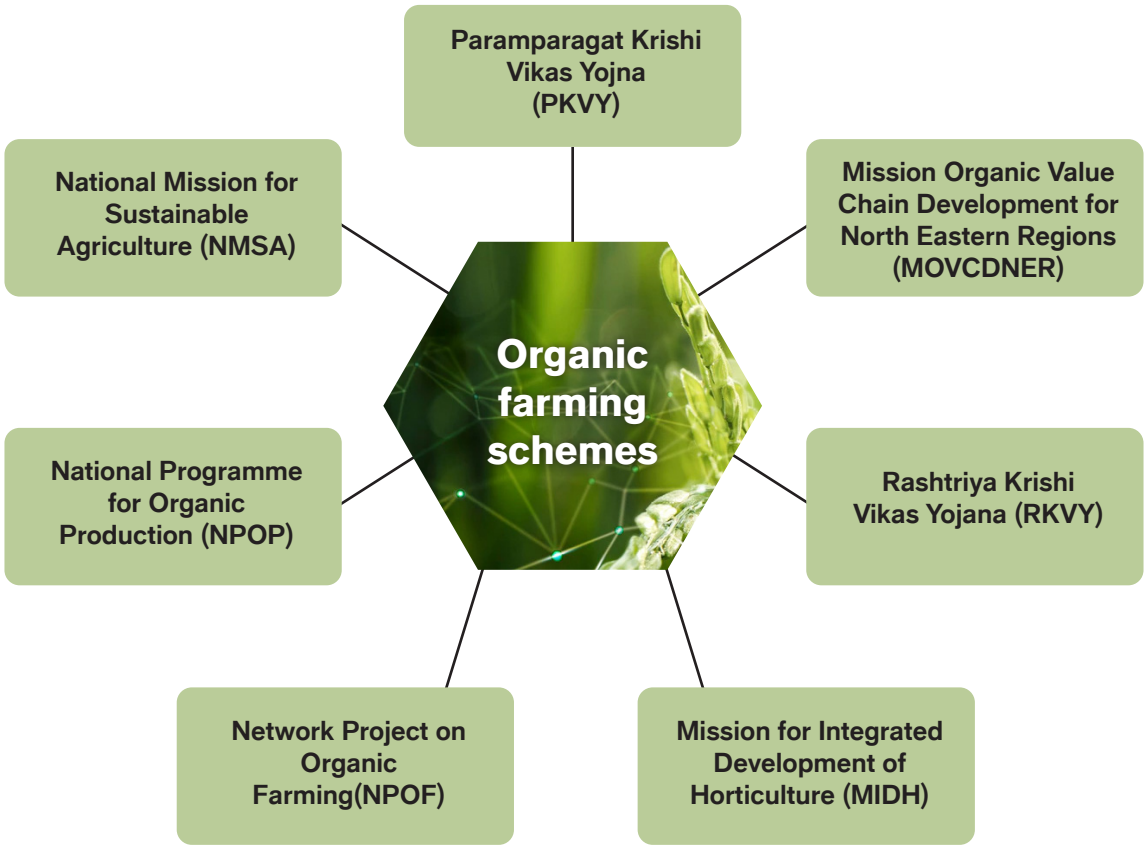

Figure 17: Various schemes led by the government to promote organic farming in India. PKVY[3]; MOVCDNER[4]; RKVY, MIDH[5] ; NPOF, NPOP[6] ; NMSA[7]

5.2. Barriers

Organic food, even though being nutritious and environmentally feasible, has certain norms attached to it posing a barrier specially at the consumption ends, over the production and supply. For example, Chinese consumers are price-sensitive and look for value when buying organic food. Chinese consumers have a norm associated with the organic food due to which they consider organic food as a luxury due to its high market price, also some of them do not consider organic food as nutritious as per their value or price in the market (The organic food market in China, 2020). The reasons consumers choose organic products vary by age group. Among them, health is the main reason for choosing organic products for all ages.

A survey result for organic producers mentioned in Organic Agriculture in China 2020, it shows that the three major factors restricting the development of the organic industry are the difficulty in product sales, the high labour cost and the insufficient government support policies. In addition, lack of technology and transportation difficulties are also factors restricting the development of the industry. For example, the education level of organic agriculture practitioners is low and the organic technology is weak. Most local organic farmers simply do not use chemical pesticides and fertilizers or only target pests and diseases (according to organic standards) without a deep understanding of what organic

[3] https://pgsindia-ncof.gov.in/PKVY/Introduction.aspx
[4] https://agricoop.nic.in/sites/default/files/movcdner_revised.pdf
[5] https://www.pib.gov.in/PressReleasePage.aspx?PRID=1778909
[6] https://apeda.gov.in/apedawebsite/organic/index.htm
[7] https://agricoop.nic.in/sites/default/files/National%20Mission%20For%20Sustainable%20Agriculture-DRAFT-Sept-2010.pdf

farming is all about -- starting with soil improvement, growing healthy plants, and lacking alternative technologies.

Another barrier is the certification process, and administrative formalities which farmers have to go through to get the certifications for the organic farming and selling of products. The uncertified products do not have that much value as compared to the ones with a certification (Deccan Herald, 2021). Another issue is that the fresh vegetables and fruits which are already available at the local market at lower prices, which are preferable by the customers instead of purchasing organic products at higher prices. There is also a lack of awareness in terms of nutritional knowledge among the consumers which also is a barrier for the organic market. Other barrier in terms of production include the requirement of isolated farm areas as the soil and water may get contaminated by the pesticides and fertilizers sprayed by other non-organic farmers, which is not so feasible for a marginal or small farmer with limited farm areas (Eyinade et.al, 2021).

From a sustainability point of view, the organic food industry is not as friendly towards the environment as people imagined. The production of organic food also exhausts a large amount of carbon dioxide and occupies much more land than traditional agriculture (The organic food market in China, 2020) and hence there is a need to address such barriers or come up with solutions which can reduce the cost of the organic products and also be feasible for farmers, the certification formalities also need to become efficient and easier, there is a must need for market digitization in order to connect farmers, sellers and the buyers to reduce the middle man cost and making the organic market more cost-efficient.

5.3. Enablers

The demand for organic products has seen a rise in the past decade. As the population is becoming aware and gaining knowledge about the food they are consuming especially in the urban areas, they are willing to consume more organic products. Though there are many hindering components in the consumption of organic products still the organic market has seen a good growth over the time which are the result of many factors. These factors can be called enablers for organic food consumption and can be discussed broadly in four categories, i.e., Policy, Technology, business and capacity building and awareness.

5.3.1. Policy

The initiatives taken by the government and other institutions have changed the organic food market completely. For example, in India, after the development of export regulation by NPOP, the Ministry of Agriculture and Farmers' Welfare introduced Participatory Guarantee System for India (PGS-India), which aims to encourage small and middle-sized farmers to take up organic farming, and also promote the organic farming in the local market at large scale. Another example is schemes such as the Paramparagat Krishi Vikas Yojana (PKVY), which is a subsidy-based scheme and have promoted the organic products (Ministry of agriculture and farmers welfare, 2022). Another such example is of certifications and schemes in Vietnam for organic food is SAFE Certification by the Ministry of Agriculture and Rural Development. which distinguish vegetables that are free of pesticide and fertilizer use. Since this is a government certification, consumers prefer and rely on this certification for their consumption (Veerappa & Chien, 2012). Another one is the 3R3G (3 Reductions 3 Gains) programme. This programme aimed at reducing three major negative inputs in the agricultural sector namely, seeds, fertilizers, and pesticides. This

intervention came at a time when farmers were under the impression that the increase in these 3 inputs will result in a better yield, in terms of quality and quantity (Hoeng et al., 2009).

Thus, these examples signify how policy as an enabler had made so much of a difference in promoting organic products as well as their production, which not just will benefit the consumer but also the famers. Further, the government along with other players like NGO's, certification centres, markets etc. can bring a shift in food choices which could help in the promotion of sustainable and healthy diets across the Asian countries.

5.3.2. Technology

Technology is a very important part of today's fast-moving world; promotion of any product requires technological intervention as nowadays people are more and more involved in digital media. Organic food has also made its way to consumers through digital platforms, which made consumers realize the benefits and nutritional value of the organic foods. In India Retail supermarkets such as Big Basket, Nature's Basket, Fab India, 24Seven, Organic India, and others are the main distribution channels for these organic foods and beverages (Chandra & Rosmann, 2020). Similarly, in Thailand Capital rice co ltd, Green Net Corp and Nature's Path Food Inc came out as major players in the organic market (Global organic trade guide, 2019). Technology has also evolved nowadays by connecting the organic farmers directly to the consumers. The farmers growing organic crops many a time face issues due to climatic conditions, pest attacks etc., which can be solved by connecting them to ministry websites or other sources which provides them the information and knowledge about farming and cultivation of organic foods and also help them reduce the post-harvest losses. Hence, the technology can be a great source for spreading awareness and bringing out an informed consumer and creating food and nutritional security.

5.3.3. Business

Markets join consumers with the producers and vice-versa and hence is an important connective link for any food category. Good market strategies do help with changing food choices and promoting organic products among the people. E.g., In China, the Organic food home delivery is doing wonders, where an organization Beijing Organic and Beyond Corporation (OABC), have come forward as an organic food company and helped in cultivation, production, distribution along with home delivery service. OABC has set up organic farms in Beijing, Shandong, Shanxi, Inner Mongolia and many other places for selling organic vegetables, fruits, grains, Chinese lake crabs and eggs, etc. In 2020, the company has completed organic food home delivery services to over 1,200,000 34 families in 6 metropolitan cities of China (Organic and Beyond, n.d).

In Vietnam, to promote the consumption of local organic produce, the Ministry of Agriculture and Rural Development began regulations on the production and distribution of clean produce labelled as SAFE (Ebrahimi, 2007). An epitome of sustainable practices in the sector of organic food in Vietnam is the organization known as Organik Farm. Organik Farm is graced with various international and national certifications such as GAP (Good Agricultural Practices), Viet GAP, and Global GAP. These certifications promote the market base for the organization, as well as provide a framework within which the organization may cultivate their produce. This calls for producers to use minimal number of pesticides. Organik Farm grows about 25 different varieties of vegetables within this domain (Sustainable Vietnam, 2020). Moving on to the retailing and consumer aspect of promoting organic food in Vietnam, another not for-profit organization known as the ACCD (Action Centre for City Development) comes into play. The ACCD focuses on the retail and the supply chain

aspects of organic produce. The ACCD receives bulk orders directly from end consumers instead of supermarkets or retail stores. They require a minimum order of 10 kg, and this product is cleaned, packed and sealed in plastic bags along with a SAFE seal, as this certification is presumed to be reliable. This is then delivered to the consumers on motorbikes. The ACCD is branching into supplying to supermarkets and mini markets on a contractual basis in the near future (Veerappa & Chien, 2012).

The above successful cases show how business strategies could help to bring healthy options to consumers tables without many efforts, and how businesses can come out as an enabler for promoting healthier diets.

5.3.4. Capacity Building

Education and capacity building helps not just the consumers but also the small scale and marginal farmers to grow. One such example is of Beijing Organic Farmer Market, this fair was launched by a group of volunteers/ consumers who are interested in ecology and agriculture, and rural farmers, and aims to build a platform for farmers who are involved in organic agriculture to communicate directly with consumers and sell their products, which not only helps farmers expand market channels but also helped the consumers find safe and healthy food (Organic and Beyond, n.d). In this way it does not only boost the self-confidence of farmers and also indirectly motivates other small and marginal famer communities to opt for organic farming but also has provided the consumers with best fresh food at an economical value, which eventually will allow even the low-income households to consume more nutritious, sustainable organic food. This will also narrow down the line between the rich and the poor, i.e., removing the dogma that organic foods are only for high-income households.

Box 3: Case study

Community Supported Agriculture- Beijing, China

In Beijing China, a first of its kind CSA farm known as Little donkey farm has been introduced to the farmers and citizens. The firm aims to amalgamate Agriculture with culture and education by mobilizing citizens, farmers, NGOs, government organization etc. The farm provides an option to grow your own vegetable fruits and other plants without any use of fertilizers or chemicals in any form. It also provides home delivery extending their reach to all.

This has provided a nutritional, chemical free food products to people, and encouraged them to grow their own food, reduced the food miles and helped in improving farmers income which eventually have helped people to move towards a healthier and sustainable diet.

Barriers: Modernization and use of modern cultivation techniques and higher dependency on fertilizers reduce the nutritional value of food and put more chemicals and toxins in the diet of people leading to severe diseases. Lack of awareness about nutritional value of what people are consuming also degraded the food choices of people over the time in the region.

Enablers: Capacity building and awareness and also business had been a key factor to play role here:

i. **Capacity building and awareness** *The firm integrated the community as a whole and made them aware about the importance of nutritional value and safety of the organic food via activities planned for children and training lessons given to teachers. Educating children helps a lot for sustaining any positive approach in future. The farm also encouraged to avoid use of any form of fertilizer which provided people in the community with fresh, cost effective chemical free organic products.*

ii. **Business:** *The farm is also providing home delivery of organic food to people, which is reducing the food miles and provide the farmers with more income options along with low inputs. Even people from low-income household could sell their produce to local consumers via online delivery, which is helping in improving the food value chain of the organic foods.*

To read more: *https://rb.gy/ffuugu*

5.4. Conclusion

Organic foods, particularly in developing and underdeveloped countries, can contribute to real socio-economic and environmentally sustainable development. This is owing to the organic principles, which entail effective management of the environment. local resources (local seed kinds, manure, etc.) and thus cost-effectiveness. On the other hand, the demand for organic products both locally and nationally is booming. On a global scale, this presents enormous growth possibilities and creative opportunities. Organic farming lowers the danger of crop failure and stabilizes the returns to small farmers' families and enhances their quality of life (Kilcher L., 2007). There are different consumption patterns, sustainable ways of promoting organic food, and policies and frameworks aimed at enhancing the organic food market across Asia. Countries like China, Vietnam, Nepal, Thailand and India are constantly looking to improve the WTP (Willingness to pay) of the

consumers of organic products. In the current scenario, there is a need for better communication with the consumers about the benefits of organic products and thier distinction from the other products in the market. The consumers should be made aware of the different standards and certifications that organic products qualify with. In instances where the consumers are willing to pay more for a healthier alternative, the authorities must work towards improving the availability, accessibility and affordability related to the products. Organic goods must become more accessible to the lower-income groups that make up the bulk of the population in these nations. To supplement this governments must collaborate with elements such as NGOs, Certification bodies, market entities and production players, which will ensure natural-food literate consumer, thus driving food security and sustainable development across Asia.

CHAPTER 6

6. Neglected and Underutilized Food Crops (NUFCs)

6.1. Overview

Neglected and un-utilized food crops which are mostly seen as new crops by researchers are actually the indigenous crops which were grown by farmers, however, with time they have been lost in the process of commercialization (economic, genetic, cultural, agronomic). Thus, the lag in information is resulting in misinterpretation related to these crops (adaptation and improvement). These crops are very prominent as centres of diversity amongst the traditional farmers and local communities. These crops remain inefficiently characterized and ignored in research and conservation. The challenges which are faced in the promotion of these crops is the commercialization or globalization of the agricultural markets. This drastically is being changed due to urbanization and loss of local markets by large enterprises. The main problem which arises is because of the question whether these crops would work and meet the required targets of the market. This leads to lack of information on their growth and selection process which further lessens the chance of improvement. Thus, the main component of its whole promotion process is securing the resource and information base of these neglected and un-utilized crops. Hence, time has come that the information available on the NUFCs should be paid immediate attention to. Regarding this, the collection and preservation of germplasm of these crops have been greatly advocated by the Global action plan of the Food and Agricultural Organization (FAO). Farmers should come forward to revise the decline in these neglected crops by revealing their importance, local use and distribution. New technologies, and policies should be widely distributed for the promotion of NUFCs worldwide (Padulosi and Hodgki1, 2002).

As per a report by Arora (2014), there are about 778 species (261 fruits, 55 root or tuber, 213 vegetables, 28 millets and pseudo cereals, 25 industrial crops, 34 nuts, 14 grains legumes/pulses and 148 others) of un- utilized species present in the Asia-Pacific region which are not utilized to their full potential. These crops have great prospects for use as they are highly rich in vitamins and minerals that could be very beneficial to human society. For example: Sweet Potatoes and Date Palm found in the Asian region are very advantageous because they are a fibrous diet and extremely rich in carotenoids and pro-Vitamin A and antioxidants. It is well documented that by 2050 a rapid increase (about 70%) would be witnessed in the urban population (even in developing countries) that would simultaneously challenge the world food chain and supply demand. Hence, there is an urgency to start bringing in NUFCs into the mainstream market by ensuring thier inclusion by local communities and commercial farmers.

Table 6: Example of some of the neglected crops in the South and Southeast Asian Countries (Bhutan, India, Myanmar, Nepal).

Fruits & Vegetables	Nuts, Seeds and Spices	Cereals	Roots & Tubers	Pulses
Indian Gooseberry Jackfruit Pumpkin Drumstick Fenugreek Roselle	Linseed Walnut Nepali pepper Nepal Butter Tree Peanut	Buckwheat Amaranth Quinoa Sorghum Finger Millet Barley Tartary Buckwheat	Sweet Potato Elephant's Foot Yam Taro Sweet Taro	Soyabean Green Gram Lentil Wild Vigna Black gram Grass pea
Source: (FAO, 2018) & (Li & Siddique, n.d.)				

Bhutan is on the right track to addressing the issues of food security; mainly driven by the introduction of various programme in the country. However, due to a lack of diversity and availability in terms of crops, about 21.2% of children are stunted and about 9% are undernourished (under the age of 5). The crop productivity is decreasing while constraints due to the inability of farmers to address the issues in the agriculture sector worsens the situation (Li & Siddique, 2020). Poor management skills, inappropriate salaries, discoordination between stakeholders and agencies, feeble research work, and limited staff are some of the major drivers of this situation. The policy makers (provincial agricultural officers) provided better feedback to NUFCs because they have better accessibility to the information related to the beneficiaries provided by NUFCs. The farmers provided very unsatisfactory judgement related to NUFCs as the information provided by government officials in relation to new techniques and food crops is not uniform because of inaccessibility. Thus, we can conclude the fact that the link between government, farmers and science is fragile (Schmidt et al., 2008).

Bhutan has launched a project "Participatory On-Farm Conservation, Sustainable Use and Management of Neglected and Un-Utilized Crop Species (NUCS) for Livelihood and Adaptation to Climate Change". This project would benefit by selecting and promoting NUFCs in the marginal areas which would help in achieving sustainable food security and will also help in the adaptation of climate resilience, food and nutrition. This project would allow a lot of recommendations which can be considered to improve the status of NUFCs in Bhutan to improve the crisis of food instability and sustainable agriculture practices. A number of policies and projects have been launched in Nepal to promote and include NUFCs in the mainstream market (**Table 7**).

Table 7: Some of the projects in regard to NUFCs in Nepal.

Projects	Description
IPGRI-APO (1991)	This project was supported by NARC in relation to crops(finger millet, barley, buckwheat, proso millet and amaranth).
In-Situ Global Project, Strengthening the scientific basis of in-situ conservation of agricultural biodiversity on-farm (1995)	This project was mainly focused to strengthen the local markets for NUFCs by linking urban-rural markets.
IFAD: High Value Agriculture Projects in Hill and Mountain Areas (2010-17)	This project links women of minimal groups in agriculture and non- tim-ber forestry.
IFAD-NUS3 Project Research on Amaranth(2013)	This project was conducted by various organizations (HCRP, NABIC) to promote the species in different areas like Jumla, Bara, Kasi etc.

Source: Panthi, 2021

Neglected food crops can be a potential source to tackle problems related to climate change as they can be well adapted to extreme weather conditions and thus form part of sustainable food production as it offers subsistence farming. These crops can also be grown in wastelands with only few inputs 68 which eventually contributes to increased production, income opportunities, better crop diversification and a better environment. Thus, we can say that these crops are environmentally friendly. NUFCs are also a good source of proteins and associated nutrients which can be suitable for human consumption (Li and Siddique, 2020). Apart from the nutritional and health aspect, NUFCs also have economic and medicinal benefits. They provide varied opportunities to farmers and small stakeholders which helps them to improve their income and thus, refine their livelihoods. They have higher nutritional and health benefits along with being organic, they become a good alternative for consumption. These crops can also be used to treat high blood pressure, glucose levels, night blindness, skin infections, gastrointestinal disorders and are a decent source of vitamins & minerals. These species can be produced with the help of minimum fertilizers and pesticides so they are considered organically beneficial. These crops are also promoting traditional knowledge and being locally adaptable so they contribute a significant amount to sustainable agricultural practices. As these NUFCs offer various opportunities to the farmers in agricultural practices that can be considered as a potential alternative for achieving zero hunger and thus needs more attention for thier consumption and production (Li and Siddique, 2020). The Neglected and Un-Utilized Crops as mentioned have a huge importance in the agricultural research system because it not only provides stability but also the required nutrition. However, due to the major crops, these crops have gone under forgetfulness. Since, the NUCFs are climate resilient also, it is our prime responsibility to convert this asset into our “Future Food”.

Box 4: Case study

Home Gardens - Nepal

In Nepal, government has introduced the concept of home gardens which will grow underutilized indigenous crops, which not only helped to improve the nutrition of the households but also help increasing the income of low-income households. The project selected species depending upon various nutrients they provide, which helped in increasing the numbers of choices available to people at lower cost along with the livelihood opportunities.

Barriers: Nepal is a country with extreme poverty and also it faces challenges due to its topology. The presence of hills and mountains creates a problem in accessibility as well as availability of food in the region. Agriculture at larger pace is also sometimes become an issue for low-income households leading to malnutrition in children, women and various disease in adults.

Enablers: Policy by government has changed the previous picture in the given study.

i. **Policy** *: The project was introduced by Ministry of Agriculture and co-operation and DADO’s which helped in protection and management of biodiversity, so that the problem of under nutrition can be solved by efficient use and introduction of underutilized or ignored indigenous crop varieties. It also has provided diversity of one nutrient on the plate for people in their own gardens with minimum input, resulting into reduced food miles a shift to sustainable diets.*

To read more: http://www.b4fn.org/index.php?id=2027

6.2. Barriers

Neglected and un-utilized food crops could be one of the most nutritious and easily available options, but these crops have a long history of negligence due to the introduction of a new variety of crops. The evolution of a new world didn't work as a way forward for these crops. Consumption of NUFCs is low as they are not the mainstream crops and either are produced or grown by a very small community or place. The major barrier to this consumption as well as production pattern is the lack of awareness and shift of people towards modern diets, people do want to include nutrition in their diet and what they consume but they are not that much aware of the type of food from which nutrition could be drawn. The negligence of NUFC's is its major barrier in itself, there are not many specific policies or initiatives by the government or organization focused on NUFC's alone. Even though now many studies are focusing on and coming up with a nutritional analysis of many NUFCs, there are also many factors which makes these crops harder to store and preserve due to sensitive shelf life as they are grown most naturally, it is very important to consume these foods within the safe period unlike the modern-day hybrid foods. As these foods are usually grown by the small and marginal farmers, the problem of storage, processing and transport will have a huge impact on the marketing and trade of NUFCs (Balderman et al., 2016). There is also a lack of knowledge among farmers regarding the cultivation of the NUFC's, the temperature, water and nutrition etc. and they usually focus more on the staple food crops and hybrid crops which are easy to cultivate and also popular among the consumers. Due to a lack of consumers, the profit for cultivating, processing of NUFCs is very low and hence making it an unpopular choice among the farmers. There is one major barrier in terms of trade which impacts the consumption of NUFCs globally is the lack of any information or presence of NUFCs under the WTO discussions. There is no rule made yet to preserve the genetic pools of the NUFCs or to promote their pools as many of the Neglected and under-utilized plants falls under the endangered category and their preservation is required (Balderman et al., 2016).

6.3. Enablers

The driving factors which can help in the promotion and better consumption of NUFCs can be divided into four major divisions, i.e., policy, technology, business and capacity building as all of them are important drivers in broader categories for understanding what can be done better to promote these crops and how they can help in building food security along with nutritional security across Asia.

6.3.1. Policy

Policies play a major role in taking the aspects of any crop to the public, trust in government makes people move towards the recommendations or guidelines provided to them. As there are almost negligible specifically focused policies or initiatives for NUFCs across Asia, there is a dire need to formulate some policies or initiative not only at the regional or state level but also at the global level, for example in the WTO agreement list, as even mere introduction of NUFCs could help to gain some views to this food group, and might instigate farmers and also consumers to learn more about them, which will help in the production as well as the consumption. Focused policies are always more successful than the umbrella policies, as focused policies get more interest of consumers and also producers. National and state governments can also put forward some subsidies on seeds or preserving seeds of these crops as they are continuously losing their genetic pools. There are certain steps taken for NUFCs by a few government and non-governmental bodies, like the International Treaty on Plant Genetic Resources which is

helping in conserving the genetic pools of such plants, other is the recommendations provided by various councils, due to which underutilized crops now have their own governing bodies (Crops for Future which complements CGIAR centres) to promote their study and improve their status for better food security. In relation to this, various organizations (Crops for Future, unification of the organizations like International Centre for Underutilized Crops (ICUC) and the Global Facilitation Unit for Underutilized Species (GFU) are working to bring NUFCs into mainstream markets. This is done by diversifying the agricultural practices (Mayes et al., 2012).

6.3.2. Technology

Technology plays a role in all aspects from production to consumption, with the advancement of technology we now have more scope to improvise our food value chains and connectivity to the consumer. As the NUFCs are mainly cultivated on small-scale local marginal farms, they are usually produced, stored, and processed manually with help of simple traditional techniques that are both labour-intensive and time-consuming (Eissing & Amend, 2008). Therefore, for NUFCs to compete with the already established ones, it is necessary to improve cultivation techniques, e.g., fertilizer use, adapted cropping systems, or biological pest treatments, as well as to use selected varieties or suitable seed storage (Padulosi et al., 2013). This was demonstrated in an Indian study by Ravi et al. (2010), where traditional millet cultivation resulted in a loss to several farmers due to low yield; while on the other hand use of advanced techniques resulted in a 60% increase in the yield. To improve the shelf-life of the NUFCs, alternative energy-saving techniques, like appropriate modified atmosphere packaging and on-farm evaporative coolers, could be explored (Liberty et al., 2013; Yumbya et al., 2014). Several local traditional preservation methods such as blanching, fermentation, air-drying, and sun-drying are already established (Muchoki et al., 2010; Nguni et al., 2007), but these methods can result in nutritional loss as well as microbial contamination (Onyang, 2008). Hence, value-adding processing should be developed to obtain nutritious products, one example is millet-based malt, which has enriched vitamins and calcium and increased iron bioavailability (Ravi et al., 2010).

Therefore, there is a requirement for improved pre- and post-harvest technologies for establishing an international value chain for the NUFCs. The processing and packaging style of NUFCs also need to be developed to satisfy consumer demands worldwide (Koolman, 2014b) as they can be a major constraint for reaching out to the international markets.

Finally, to better promote the production and consumption of NUFCs, especially in respect of attracting more young consumers, digital media can be used as a tool, for example Facebook, Twitter, YouTube, Instagram, etc.

6.3.3. Business

Markets are one of the main points of interaction between the producer and the consumer, and it is a deciding factor in the choice of food and shift in the dietary patterns. To promote and increase the consumption of NUFCs, their integration into different markets and production systems is a prerequisite (Wezel et al., 2016). To bring NUFCs into international, national and regional markets, the trade barriers are needed to be addressed. This requires the involvement of numerous and diverse stakeholders, who will help in facilitating the marketing of these NUFCs through collaborative actions, like creating regional networks of smallholder & marginal farmers and partnerships between different actors along the value chain to improve the post-harvest handling and marketing of the NUFCs (Latynskiy et al., 2016; Lowitt et al., 2015). Another major issue while discussing

trade barriers is country borders which are regulated by various law systems, traditions and indigenous customer expectations.

An umbrella certification based on standard parameters can be helpful to get rid of such trade barriers (Preissel et al., 2010). As many of these species of NUFCs are under the endangered category, their overexploitation should also be controlled by putting it under CITES and the import and exports should also be checked or minimized as required. To effectively overcome these trade barriers, there should be a practical will to face barriers and find definite solutions with help of all stakeholders involved. All the stakeholders and the partners should commit to enhancing the trade of NUFCs, and such commitments should also extend to policy-makers and government agents to support small and marginal farmers, who will benefit from the marketing of NUFCs (Aju et al., 2013).

6.3.4. Capacity Building

Education is a key factor in improving and shifting the dietary patterns among people. Education and awareness can totally help in changing the food choices of the masses, therefore it's high time to educate and aware our population specially youths about the nutritional, medicinal and ecological value of NUFCs. NUFC's can also help to empower the small and marginal farmers and the vulnerable communities, a successful example of this is a 10-year project funded by IFAD and coordinated by Biodiversity International where NUFC has become important in generating income for the poor. In India, local entrepreneurs who added value to the minor millets by producing handy, nutritious millet products and derived net incomes ranging from 15,000 to 45,250 (about USD 300 to 950) Indian Rupees per ton. Along with enhancing entrepreneurs' incomes, this also created work, particularly for women, at the rate of 140 to 300 person-days per ton of grain. In Nepal and India, NUFCs have played a prominent role in empowering women, and boosting their self-confidence. Other countries involved in the project have seen similar results (Padulosi et.al, 2013). Enhancing community participation is also very important, especially including the tribal communities that have wide knowledge of the production and harvest of such crops, and it can also boost their self-esteem and would help them with a better source of income (Padulosi et.al, 2013).

6.4. Conclusion

The Neglected and Underutilised Food Crops can be used as a potential tool to ensure that sustainable food security is achieved. They provide remarkable opportunities in all Asian countries to not only improve their dietary and consumption pattern but also the income of farmers and others who are connected in the value chain. These crops are being lost at an alarming rate before being completely researched due to various economic, environmental, political and social factors which are ultimately leading to the staple crops taking over the commercial global market. In the last few decades especially after the green revolution, the commercialization of few crops to achieve the specific agricultural targets by implementing projects and policies has led to the marginalization of the NUCFs despite their innate significant adaptive and prominent livelihood features. These crops are one of the prerequisites for achieving universal food security because at the country level, NUFCs can strengthen food and economic shocks. Throughout history, it is mentioned how farmers and local communities have relied on the crops as “Famine Food” (during 2004 tsunamis especially in Asian Countries) where all the important staple crops have failed immensely. Though the NUFCs have a lower yield in comparison to the staple crops, however, they are more resilient to climate change and biotic factors which makes them quite favourable. The loss of these crops can have serious implications in terms of agricultural diversity as there can be lower ecosystem functionality, socio-economic shocks and less diversification. Hence, there is an urgent need for implementation of appropriate and strong policies to bring these crops to the mainstream international market (Padulosi et al., 2013)

CHAPTER 7

7. Local Food

7.1. Overview

Though there is complexity involved in the concept of the definition and understanding of local food and it is still a contested topic, it is largely associated with the people and places where the food is produced and consumed and how it is positively supplementing other aspects of food security. Food miles in simplest terms can be defined as the distance travelled by food to reach from farms to the consumer. The recent popularization of food miles as a concept reflects how the food sector has globalized, in turn leading to rising demands for exotic and out of season food and vegetable products, surging food prices and fuels, carbon emissions and mainly environmental concerns.

Food systems having their basis laid out in the local ecosystems are seen as solution to reducing food miles. Local food has been recognized in relation to food systems or supply chains where food is produced in closer or nearby areas to the consumers. The local food system has a shorter supply chain implying lesser intermediaries. It also signifies the local cultural and symbolic values of the region or country. Local and regional food systems are essential for communities in both rural and urban areas. They provide various benefits from improving business capacity to supplying nutritious and fresh food with the help of a shorter supply chain. The concept of local food is still in a nascent stage and is complex in nature with various definitions being advocated across the world. There are instances of local produce being highly valued in countries such as North America where one can find a separate shelf designated for locally produced food in supermarkets.

Countries across the world have different sets of parameters to consider the product as local food. For example, countries like France, the US, and Canada have tried to standardise the meaning of local produce for promoting and having its own identity. As per the Indonesian perspective, the food that is consumed by the local community as per their efficacies, knowledge and wisdom is known as local food (Andoko et al., 2021). Food production, as well as how it affects health, the economy, and the environment, are all sources of inspiration for local food systems. A local food system thus integrates the notions of “food security” and “food economics” in some aspects (Coehlo et al., 2018). Though there is the complexity involved in the concept of the definition and understanding of local food and is still a contested topic, it is largely associated with the people and places where the food is produced and consumed and how it is positively supplementing other aspects of food security.

It is expected that by the year 2050, from the 11 billion population, 7 billion would be residing in the urban regions (UN, 2018). In this, the Global South, importantly Asia and Africa would accumulate 90% of urban population growth in the future (Pauleit, El Wafa and Pribadi, 2019). With such a huge transition from rural to an urban setting, an associated increase in poverty of around 30% is forecasted in Asia (UN, 2018a). Such conditions reflect the scarcity of basic needs and even availability of local food provision. Hence, exposing the at-risk people to food insecurity. The reduced availability of cheaper yet nutritious food and the pressure of increasing prices due to added cost of food miles to the available commodity is felt quite acutely by the lower-income households in urban areas, where generally the idea of attaining self-sufficiency and lower dependence on imports is quite difficult and hence, a way to promote local food which is more diverse, fresh, nutritious in urban regions becomes essential. This, essentiality could be met, to some extent, by urban agricultural practices. Urban agriculture is defined as, “the growing of plants and the raising of animals within and around cities” (FAO, 2019). Products generated via this practice are used to feed the local population of cities and self-sustenance for the lower income producers in the urban and peri-urban areas. Thus, it serves

as a great source of local food for urban areas.

Consumption of locally available staples, like rice in most parts of Asia, is not easily compromised and does not vary much with the households' economic capability while consumption of meat, fruits and vegetables tends to be higher in the more economically forward households (Hafizah, 2020). For instance, Indonesia has a wide array of local food varieties but still across all socio-economic spheres the consumption of locally produced rice has been highest through the years (Pusdatin, 2018; Andoko et al., 2021) (Figure 18). When compared to the recommended standards in the country, the achievement of dietary energy adequacy was above the recommended only for cereals which mainly consist of rice, fats and oil (Figure 19). In comparison, locally produced vegetables, roots and tubers as well as legumes remained below the recommended standards. In Sri Lanka, maize is very popular and is consumed by all the major households despite the income bracket though the type of maize product consumed may differ across geography and social groups (Jayatissa et al., 2014).

Box 5: Urban farming in Malaysia

Malaysia is a rapidly developing country and has experienced major demographic and socioeconomic changes in the past few decades. The country's food production is unable to its domestic demand and hence is a net importer of food meeting about 70% of food demand through imports (MOA, 2020). Even rice which is the staple cereal of the country, 30- 40% is met through imports.

Malaysia's agriculture policies and initiatives have a history of promoting local food production. The 'Green Book' program (1974) was launched with the aim to make Malaysia self-sufficient in food production. Here the farmers were encouraged to grow vegetables, rear livestock and increase production of rice for both personal and local consumption or to enhance household income regardless of where the producers lived. The challenging times of Covid-19 and disrupted supply of imports has put more pressure on the need of producing locally and making general people understand the advantages of local and seasonal food. In Malaysia, urban agriculture is recognized as a sustainable development method to food production that can provide food locally. Though Malaysia saw the potential and emergence of Urban Agriculture since 2005, it was only in 2014 that the agriculture department of Malaysia started implementing the urban agriculture programme. Currently there are around 11,000 communities involved. The Malaysian government aims to increase this number to 22,000 by 2030.

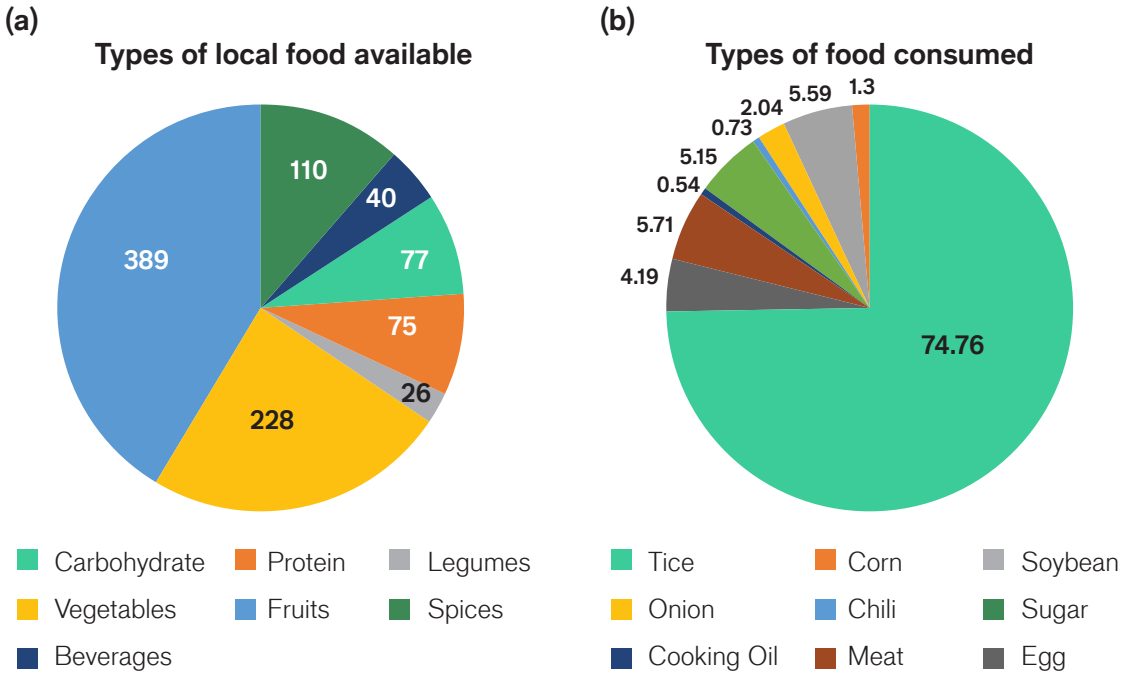

Figure 18: Proportion of local food availability and consumption in Indonesia; (a) shows how many types (species) of local food are available, (b) shows the types of food that are actually consumed.
Source: Pusdatin, 2018

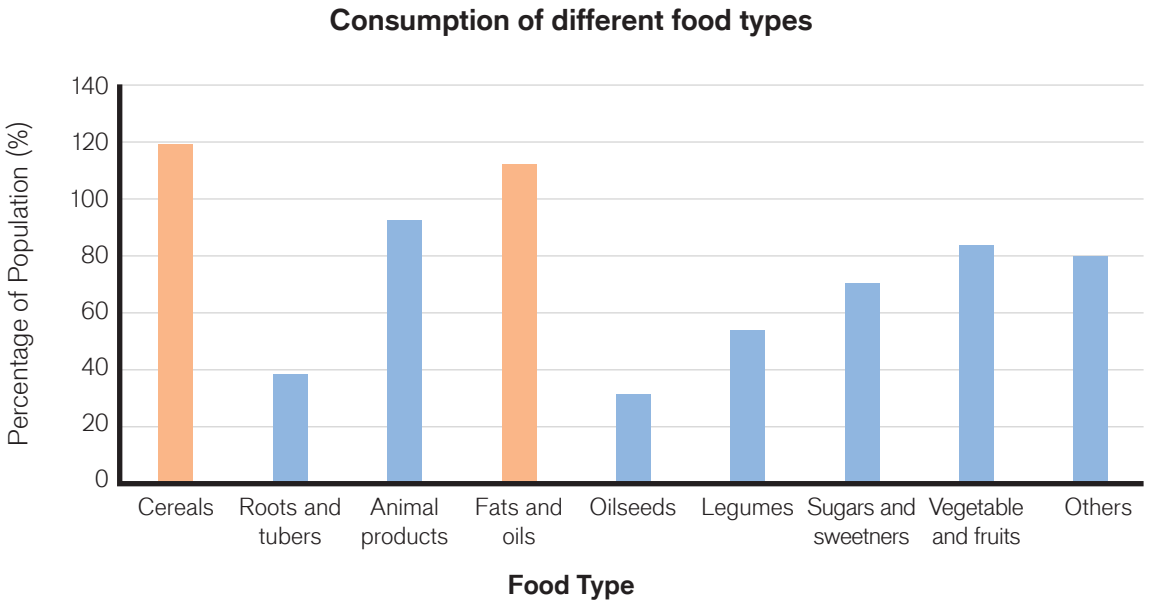

Figure 19: Consumption of different food items as a proportion of the recommended values in Indonesia.
Source: Andoko, 2021. Red font indicates where proportion exceeds the recommended (100%) values.

Consumption of cheaper alternatives that provide more calories as compared to rice, such as maize and cassava, tend to be more popular amongst the lower income households (Van Der Eng, 1998; Mota-Gutierrez and O'Brien, 2020). Crops like cassava are known as the poor man's crop in many countries. However, they can serve as a good alternative food. For instance, in the 1960s in Indonesia, cassava came into prominence when domestic rice prices in Indonesia sore in the 1960s due to a ban on its import (Dixon, 1979; Usman, 2007). In Sri Lanka, during the years of lower production of rice, wheat has been seen as the substitute accounting for the calorie consumption of the people (Jayatissa et al., 2014). Due to variation in prices and the cheaper cost of staples like rice and maize compared to meat, fruits and vegetables, individuals from the lower income section cut down on the consumption of the latter kind of nutritious and important food (Headey & Ruel, 2020).

A study on the consumption pattern of local food in Indonesia highlighted that consumption of fresh vegetables and fish remains high in rural areas so long as they are locally produced and easily accessible irrespective of the income status (Mota-Gutierrez and O'Brien, 2020). A similar trend was observed in Sri Lanka too, where in areas with farmers producing rice for subsistence, rice consumption is high in both the lower- and upper- income households although the variety preferred may vary (Jayatissa et al., 2014). Thus, the rural and lower-income households of the country who are dependent on rice as their main staple has benefited from the rising in-house production of rice. This is due to the subsistence production which may not yield higher income but produce substantial quantities for the household's self-consumption. Whereas, regions with more urban poor were not able to accomplish such a pattern and firstly they depend only on market hence the higher cost of food and their low purchasing power is a barrier to healthier dietary patterns. Hence, urban farming which promotes the production of local food for self-sufficiency and diet diversity becomes an essential and sustainable method of food security for the urban poor.

Local food which has been produced "locally" is cheaper as the cost of transport and middlemen gets removed from the equation, hence reducing food miles associated with it. Locally produced food could be more nutritious especially in terms of highly perishable but nutritious vegetables where the nutritive value declines with every passing of time. Thus, locally produced food can contribute towards making healthy and nutritious food affordable for lower income households.

Lower-income households especially in rural areas depend majorly on locally produced food while their urban counterparts consume more of the lower priced food items in the market (Jayatissa et al., 2014; Headey & Ruel, 2020). Thus, we can infer that food consumption among the lower income households is driven by the local production of food in rural areas while in urban areas availability, accessibility and affordability of food in the market plays an important role. Different lower-income communities exhibit different characteristics concerning how much staples they consume influenced by factors such as their cultural beliefs, availability and accessibility of rice and livelihood (Jayatissa et al., 2014).

7.2. Barriers:

Local food can become a boon to check the food security in Asia. Though, being easily available and nutritious, local food face many barriers and is still not popular and consumed as other foods. As the majority of Asian nations have a history of colonization and under sufficiency and most of them are developing or underdeveloped, the impact is highly reflected in the food & food choices, local food has been subsided in the past which had made a trend over the decade time). It has also been noticed that when any Asian country becomes economically developed, it tends to rely on imported food products. Higher reliance on importing food items has been showcasing the glaring disadvantage in producing local food items which affects the stability of food accessibility to the lower-income households and also the small and marginal farmers which are dependent on local crop cultivation (Henegedara, 2018).

To date only selected local foods have been part of people's diet and others are getting extinct from the food baskets. This unpopularity has also lowered the scope of R&D in the local food sector which causes many pre-and post-harvest losses. Local foods are usually indigenous varieties and are adapted to particular environmental conditions, soil etc. which makes them further more vulnerable.

In the past there was also a lack of governmental initiatives or support in the promotion of local foods, which has affected their consumption and production. Even theough they are more affordable and sustainable food option they face problems to be in the mainstream markets which could increase their reachability which had eventually led to increased food miles.

7.3. Enablers

7.3.1. Policy

For reducing the barriers to local food consumption and production, policy initiatives by the governments and other non-governmental organizations and authorities play a vital role. Government can influence a wide range of audience and thus this has a larger impact. There have been few policies and initiatives in different regions of Asia which have resulted in improving the current circumstance in the production and consumption of local foods. E.g., in 2020, the Agriculture and Food Industry of Malaysia launched the Urban Agriculture Project. The urban agriculture programme of Malaysia is also supported by environmentally friendly NGOs. Integrating agriculture into urban planning supports not just the aim to enhance local produce but other strategic aspects to food security, recreation, education and landscape enhancement (Dardak & Muhammad, 2021). Another example is of Keshwab's region in Sri Lanka where due to a lack of farming opportunities people were abandoning the paddy crops and were migrating to urban areas. Under the aegis of RUAF and funded assessment of CDKN along with the Janathakshan climate change initiative, two pilot projects were thus initiated with the first focusing on rehabilitating the abandoned paddy fields while the second working on intensifying home gardening in Kesbewa (Dubbeling, 2015). This had been successful and helped people to earn from localized farming of paddy and other similar crops. In the state of Tamil Nadu in India, The Tamil Nadu government promoting urban farming initiatives under the Urban Horticulture Development Scheme, by launching a DO-IT-YOURSELF KIT for enabling people to grow fruits and vegetables to suffice themselves on their terrace (Department of Horticulture and Plantation Crops, 2012). All these examples reflect how policy can come forward as an enabler for promoting the localized food and bringing self-sufficiency to every region of Asia, and building a food secure region.

Box 6: Case studies

Conserving Local Crop Varieties in School Gardens: Cavite, Philippines

The International Development and Research Centre in 2012 installed a 3-year project in Cavite province of Philippines, where it has introduced and tested an integrated school nutrition model. Focusing on conserving the climate resistant and nutritionally important crop by enhancing school garden using bio-intensive gardening method, establishing crop museum, supplementary feeding of indigenous vegetables from gardens and spreading awareness among all age groups and incorporating indigenous vegetable recipes for school feeding project.

To diversify gardens, different indigenous vegetables were introduced to school gardens, various school were selected to provide the components of the scheme. This came out as a success story which improvised the availability of indigenous crops in school garden, made the schools self-sufficient, by making a year-round availability of vegetables which altogether resulted into 28% of decrease in rate of underweight children.

Barriers: Modernization in the region, had led to hike in prices eventually putting pressure on households which made them consume more convenience food over indigenous vegetables and resulted in loss of rich culinary gardens. Modern farming techniques and dependency on commercial seeds added to the issue, gradually breaking the link between children and their indigenous food system.

Enablers: There has been policy, technology and capacity building which worked as catalyst for the project.

i. **Policy:** *Policy such as Gulayan sa Paaralan was initiated after the prevalence of malnutrition, hunger and poverty. Another is the Agri-Pinoy framework which was implemented by the government for building sustainable gardens and promote healthy diets.*

ii. **Technology:** *Bio-intensive agriculture had been a specific enabler along with use of fortification techniques, e.g., iron fortified rice, lab tested menus of different formulas, which proved as game changer.*

iii. **Awareness:** *A booklet was developed of recipes with indigenous vegetables. Educational posters were provided to people along with various training and educational programmes which were held for teachers to do mentoring as well as monitoring.*

To read more: *http://www.b4fn.org/case-studies/case-studies/conserving-local-crop-varieties-in-school-gardens/*

7.3.2. Technology

Technology can provide various tools for improving the food value chain of the local foods and helping in enhancing their production and consumption. A study conducted in Klang Valley, Malaysia aimed to understand how efficient urban agriculture and farming technique is at reducing household expenses and help reducing the burden on food imports. Four popular urban environmentally friendly farming techniques found were that are aquaponics, fertigation, hydroponics and vertical farming, aquaponics was the most popular farming technique and was seen as the most efficient of all. (Muhammad et al.,

2020). Such efficient technologies can help reduce the barrier of limited land and space in today's rapidly urbanizing era. Another technological enabler could be in form of networking where consumers could be connected to local farmers and buy the product directly from them benefiting both the stakeholders. This will also help in reducing the pre-and post-harvest losses of the farmers, and increase the food safety for the consumers. Urban and at home farming, aquaponics etc. could also solve the problem of food miles for the low- income household making them self-sufficient and both nutritionally and economically secure.

7.3.3. Business

Business strategies could help build the food value chain for the local crops. To reduce the food miles, the local food crops should be more and more marketed as to be grown at home. This will reduce all the storage and other charges on it making it economically feasible and highly sustainable. The nutritional value of the local food could be reduced if it would need more storage and transportation, and hence reducing the transportation and storage time can bring more and more nutritional value to the local food, which could create an extensive market for consumers and as well as for the farmers.

Online platforms can help in promoting such activities as urban agriculture, aquaponics etc. by helping people to grow their own food with minimum effort and maximum nutrition. This would be very beneficial for low-income households. There is a need to create a small market value chain for the local food instead of an excessive heavy and larger chain as this could only address the problem of increased food miles, especially in the regions where climatic conditions and topography is not enablers like in the hill and mountain regions of Asia. This will also support the local and tribal communities and will empower the women of the low-income households. Local food production and consumption could create a total food secure system by strengthening all four components of food security, i.e., accessibility, availability, food security and utilization.

7.3.4. Capacity Building and Awareness

Capacity building, education and awareness is an essential component for promoting sustainable diets. Bringing communities together does help in increasing awareness and spreading information for best practices to improve food security. E.g., Local Farmers, Local Food (LFLF), this was an event organized in Malaysia consisting of a variety of professionals such as farmers, doctors, indigenous members, activists, educational professionals etc. representing 11 states of the country. This also had participation from an international body of volunteers. This LFLF event held in Kedah, Malaysia, 2021 is regarded as the first Slow Food Community in Malaysia and Southeast Asia. The event was organized with the aim of sharing best practices, experiences, methods and goals for the local farmers who can learn from each other and professionals can take experiences to their classrooms, research, further analysis etc. Apart from these, discussions were around indigenous methods, Malaysian Culture and local food and their various aspects. The group also aims to make LFLA a sustainable roadway to reach desired policies with the government. This is an excellent example of how fruitful could be the results if communities come together. One such examples in India is of Sanjha Chulha scheme by GOI, where they promote community cooking and use of localized food thereby helping the communities to become self-sufficient.

The awareness programme could make the non -mainstream communities to value their cultures and traditions more and sensitize them of the resources they have and how to utilize them to get the maximum out of it which could get them out of the poverty and make them independent in terms of consumption. This could also help in improving health and helping these vulnerable groups of societies during the time such as the recent pandemic of 2019.

7.4. Conclusion

Local food systems are not just seen through the perspective of the distance between the producers and consumers but are attached to aspects such as freshness, promoting and supporting local producers, and tackling environmental concerns. Local food supply chains consist of lesser checkpoints in-between the producers and consumers such as community- supported agriculture is one of the widely talked about methods to promote a better sustainable consumption system.

Regular crop production and the idea of a usual distribution system need further transitions and promotion to local sales opportunities as well. The concept of local food has undoubtedly served as an important ideological and behavioural role in highlighting various aspects of the food system. With respect to the comparison of local food systems to other food systems, and according to studies there are a number of intermediary examples revealing the dynamic of both local and global food chains, as well as the formation of new chain topologies in response to market opportunities. Rather than seeing local and global as diametrically opposed, sustainability evaluation must evaluate scenarios when “global” and “local” food chains complement and synergize. (Brunori et al., 2016).

Overall, urban agriculture is an emerging practice in many parts of Asia which provides wide range of functions such as economic revitalization, effective city supply chain, community engagement, waste management, energy conservation, biodiversity etc. This contributes towards securing features of various sustainable development goals and healthy development of localized food systems especially in urban and peri-urban regions.

CHAPTER 8

8. Traditional food consumption

8.1. Overview

The diversity of a country through its culture, race, and ethnicity will be visible in the types of food consumed among them. The multicultural societies adhere to the passage of the traditional knowledge on food to the next generation as a practice of maintaining the cultural identity throughout generations. A multicultural society also holds the importance of cross-culture sharing of food practices, and to quote a recent event from Singapore, where a campaign called, "Cook a pot of curry" was conducted to provide a platform for different cultural communities to come together and create a space to acknowledge the importance of traditional food as part of their daily meal in a multi-culture nation (Reddy and van Dam, 2020). The knowledge of traditional practices, and dietary pattern over time has got restricted within the boundaries of the rural and indigenous households which is also a threat of over powering by cheap processed foods. The integration of traditional food into a nation's food production and development schemes differ between countries (Reddy and van Dam, 2020).

The United Nations in its recent move approved the Indian government's proposal of declaration of 2023 as International Year of Millets. The resolution was supported by more than 70 countries. The resolution aims to raise public awareness of millets' health advantages as well as their potential for production under harsh climate change conditions. The recognition of the indigenous crop at an international level is expected to alleviate the status of the crop as well as maximize the income of farmers.

India is the homeland of one of the earliest civilizations that existed in the world. The country has a recorded history of about 4500-5000 years, starting from the Indus valley civilization. The earliest evidence of food habits in the Indian sub-continent have been found in epics like Ramayana and Mahabharata as well from the Vedic texts. Starting with the earliest literary traditions dating back to the ninth century B.C., rice had a special status and was cherished as food with distinct ritual, medicinal, and social importance. The importance of rice transitioned through time and the evidence of the same can be found in Buddhist as well as Jain texts. With time Barley emerged as an important food in India. These were used to make several traditional dishes, fermented foods as well as beverages (Dave, 2021).

Some of the traditional preparations stood strong during changing times and can still be found being served in modern India. Crops like rice, and millets served some non-culinary purposes as well. Traditionally, these were also used for treating illness. Rice broth was used for treating dysentery, while some rice preparations aided patients with asthma (Kumar, 1988). Over time, the diversity in agricultural crops expanded its horizon and people started using wheat, millets, maize, sorghum etc. for their food preparations.

As a result of the Green Revolution, India has lost about 104,000 varieties of traditional rice crop since the 1970s, the crops which took thousands of years to evolve (retried from a report in The Hindu, dated 06-04- 2021) ("From 110,000 varieties of rice to only 6,000 now," 2012). Apart from the destruction of traditional crop varieties, the introduction of High Yielding Varieties (HYV) seeds forced the farmers to adopt unsustainable farming methods which are harmful to the health of the producer, consumer as well as the environment. The area under cultivation has increased post Green Revolution, but on the contrary, the area for the cultivation of coarse crops has seen a sharp decline. Production of crops like Sorghum, Barley, and various types of millets has decreased drastically. This has affected the consumption patterns in the country and people have shifted from a more conventional diet to modern dietary patterns (Nelson et al., 2019) This reduction in the consumption of coarse cereals has impacted the nutritional intake of the populations. Lack of coarse

cereals in the Indian diet results in a deficiency of micronutrients among people (Nelson et al., 2019). Furthermore, the immense use of chemicals while the production of these HYV yielded crops has been taking a toll on human health.

There are numerous medicinal advantages of traditional foods, indigenous varieties of rice include medicinal varieties, aromatic rice along with coloured varieties. Aboriginal varieties of rice and millets are resistant to droughts, floods as well as changes in salinity. Eastern India's Dharical, Dular, and Tilak Kacheri, for example, may adapt to a variety of topography, climate, and soil conditions. Traditional rice cultivars are more nutritionally dense than hybrid rice variants. They are abundant in fibre and contain minerals and vitamins like niacin, thiamine, iron, riboflavin, vitamin D, and calcium. Furthermore, through lowering glycaemic and insulin responses, these cultivars have various health benefits, which include lowering the risk of type 2 diabetes, obesity, and cardiovascular ailments.

Table 8: Traditional varieties of rice and their specific advantage.

Name	Area	Specifications
Jatu	Kullu valley- Himachal Pradesh	Rich aroma and taste
Matali & Lal Dhan	Himachal Pradesh	Curing fever and reduce elevated blood pressure
Kafalya	Himachal Pradesh, Uttar Pradesh	Treatment of Leucorrhea and complications from abortion
Kari Kagga & Atikaya	Karnataka	Regulates body heat and preparation of tonic
Neelam Samba	Tami Nadu	Given to lactating mothers
Maappillai Samba	Tamil Nadu	Increase fertility in men
Kullakar	Tamil Nadu	Given to pregnant women
Nawara red rice	Kerala	Helps in treating diabetes
Kalawati black rice	Odisha	Helps in treating cancer as well as Vitamin B12 deficiency
Sandstone		Aroma
Black rice	North east India, Gujarat	Anti-cancer properties, soothe inflammation due to allergies
Karinjan & Karimalakaran	Kerala	Rich in fibre, reduces risk of diabetes

Source: Derived from Sulochana and Kunjithapatham (2015), Nagarajan (2018), Eliazer Nelson et al. (2019), Attenborough and Lagarde (2020).

The government through the Ministry of Culture and Tourism is trying to promote traditional foods through tourism related initiatives like Bharat Parv, Paryatan Parv etc. Guidelines for declaring a clean street food centre have been drafted, which include improving the infrastructure of the country's existing food streets to popularize and promote regional and local cuisines. Cleanliness in local stalls is being promoted and maintained to ensure the safe delivery of hygienic food. The Ministry even launched a book on Indian cuisine to raise awareness among the citizens (PIB, 2018).

Japan has got its regional and traditional dishes as a result of centuries of political, economic, and social instability. Traditional Japanese cuisine (Washoku) consists mostly of rice, miso soup, and other dishes prepared with seasonal ingredients in mind. While the name "Washoku" technically means "Japanese cuisine," it refers to a far larger and

more significant cultural notion. Washoku was listed on UNESCO's list of intangible cultural heritages in 2013. The organization's definition of Washoku explains why it is so much more than food and why it needs to be recognized as an important element of global culture. Washoku is a "social activity based on a collection of skills, knowledge, practice, and traditions relating to the production, processing, preparation, and consumption of food," according to UNESCO.

Vietnam, the third largest rice exporter in the world ("Exclusive," 2021), conceptualized their food security policy by concentrating on the cultural importance of rice consumption, and self-sufficiency in rice production. In Vietnam, the rice production steeped up from the 1980s to 1990s with the introduction of rice collectivization under the socialist administration, and the re-privatization of land with agricultural intensification practices (Raymond, 2008). This exploded the rice production in Vietnam, which resulted in the country becoming one of the major exporters of rice, but afterwards post the early millennium period it reached a position where the production and agricultural yield reached a stable limit enough for self- sufficiency of the citizens. Whilst talking about traditional foods of Vietnam, it is highly important to address the differences in the consumption pattern between urban, peri-urban, and rural households. The study conducted by Nguyen et al. (2021) on the interaction between food environment and unhealthy consumption between different transects as mentioned earlier states that out of the total food expenditure of the rural households only 60% is constituted of food costs whereas it is 77% and 100% for peri-urban and urban regions in Vietnam. This indicates that the dependence on self-produced or non-market food is high in the rural households. The study by Nguyen et al. (2021) also mentions that the diversity of food available in the nearby food service stores, open markets, and convenience stores decline from urban to rural transects, and it was noted that in the rural regions the price of ultra-processed food commodities is less and the price of meat as too expensive thus influencing an unhealthy dietary consumption. One other factor affecting the traditional dietary intake of rural households is the decreasing proportion of small holder farmers in Vietnam. The study conducted by Kyeyune and Turner (2016) illustrates the vulnerability faced by the upland ethnic minority population in Vietnam upon integration of hybrid maize seeds, which is causing a decline in their traditional crop rotation pattern with the cultivation of pumpkins and beans in between the traditional maize cultivation, the preference of traditional maize variety over hybrid ones for human consumption thus restricting the use of hybrid maize as a livestock feedstock.

8.2. Barriers

The modern-day food habits have brought a revolutionary change in the traditional food systems, over the decade with urbanization the food choices of people have evolved due to the better purchasing power, rapid development, a rise in fast food joints and the need for ready-to-made foods because of the growing work culture, women empowerment and extreme commercialization. At the consumption end, the majority of the population nowadays is drawn towards the easy to eat food which is easily available on some side joints, even after being informed about the low nutritional value and health risk related to the fast foods, consumers are drawn to buy them due to the paucity of time. The traditional food on the other hand is the result of generational development in cooking and hence requires some time to get cooked properly and hence it is not a preferred choice nowadays. There is no much experiment done yet to convert the traditional foods into handy, easy to made foods and thus there is a lack in popularity of the traditional foods. On the side of production, traditional food is taken over by the hybrid food and modern agricultural practices, however traditional foods are environmentally feasible and are resistant to environmental havoc like droughts, floods and pest infestations and also does requires fewer pesticides and fertilizers to grow but they are not equally as par in production as the new hybrid varieties of crops which are dependent on a higher number of fertilizers and chemicals for their growth.

Another barrier is the generational gap between the population, and the lack of knowledge of the production, processing and preparation of the traditional foods. The paucity of land with rapid urbanization and increasing population, gives the small and marginal farmers very less space which they want to utilize for the commercialized crops instead of the less popular traditional crops. Due to less popularity and awareness of the traditional foods, the market value for them is also quite low, which is not feasible for the small and marginal farmers however in this way they can get popular for the consumer consumptions especially to the lower-income household. There is also no particular support from the government agencies or any major specific policies which talks about the traditional foods only, generally these foods are covered under some umbrella scheme which takes the focus away from the traditional food and crops as compared to the other popular crops and foods.

Thus, there is a dire need to protect the traditional foods and crops in order to protect our rich cultures and also to protect and maintain the food as well as the nutritional security in today's as well as the upcoming generations and pave a way for the sustainable production and consumption.

8.3. Enablers

As discussed, traditional foods have a lot of barriers due to which they are losing their value over time. However, there is still a hope and there exist many enablers who have not yet let these traditional foods go extinct or lose their value completely. The enablers for the same can be broadly analysed into four categories, i.e., policy, technology, business and capacity building and awareness, to know what is the current success stories and what can be the future possibilities of the traditional foods.

8.3.1. Policy

Policies and government initiatives or various organizational support are a big factor in terms of promoting any type of foods. For example, in India a collaborative project on the National Directory of Traditional Food Recipes of India has been initiated, to promote the traditional foods and along with it the cultural heritage of the nation. Another one is the launch of a book on regional traditional foods (The business standard, 2017). These initiatives and steps show how the government support could help in embracing and promoting traditional foods. The government can also provide subsidies for such crops and foods which may help in improving the status of these crops among the farmers ultimately raising their production and consumption. Another example of governmental support is the popularity of Thai food, Thailand was the first country to pioneer the concept of gastro diplomacy. It is strategy countries use to promote their traditional foods to foreign audiences. Since 2002, the Thai government has funded and supported thousands of restaurants around the world that make "authentic" Thai food through the Global Thai programme, making Thai traditional food popular globally. The Thai government looks for existing restaurants owned by immigrants who are ethnically Thai and make Thai dishes (Richards, 2012). The Thai Foreign Ministry will then honour these restaurants with the "Thai Select" award. These eateries will continue to receive financial support from the Thai government while also being able to advertise themselves using the "Thai Select" trademarks on thier menu and promotional materials. This type of policy support sets an example across Asia for how to support and popularize traditional food globally.

8.3.2. Technology

Technological advancements can not only improve the status of traditional food, but also can enhance its nutritional value. For example, biofortification of crops like millets, which can also have positive impact on their consumption. Technological advancement has also helped farmers to connect to various informative channels via radio, television, mobile applications and various online platforms and also to government platforms which provide information regarding farming practices, better yields and market situation. The digitization of farmers can also help to keep track of what they are growing. On the hand of consumers technology has connected them to know the nutritional value of many crops and traditional foods, which might help to revive these foods in near future. It also helps the people to share their experiences across the globe about the food they are consuming and the diversity of the traditional foods can be shared via the digital platforms. This can create a pool of traditional food and can protect the age-old traditions and rich culture of Asia.

8.3.3. Business

The supermarkets and the restaurants are the major source of food for consumers nowadays, these markets influence the food choices of people. These markets can popularize the traditional food and thus there is a need to modify these traditional foods and popularize them by selling them at supermarkets. This will also help to boost the confidence as well as the economic conditions of the marginal and small farmers. Diversifying the ways in which traditional foods are used will ensure sustained production, irrespective of changes in agricultural policies, lifestyles or dietary trends. Diversity in uses, just like genetic diversity, is crucial to the survival of crops. The market value chain of traditional foods can be strengthened by some examples like Thailand, where the restaurants are motivated to sell the traditional cuisines, which not only will generate revenue but also will boost the tourism sector, which will again help these foods to reach more people and maintain its cultural identity.

8.3.4. Capacity Building and Awareness

Awareness and capacity building helps in improving the production and as well as consumption eventually shifting dietary patterns into sustainable patterns. This can be done through campaigns, shows and other programme. Moreover, these campaigns are based on the consumer's self-awareness of what one eats and how (traditional) food has to be prepared to contribute to a healthy diet. The reintroduction of traditional crops and better identification with traditional values can be supported by the revival of cultural elements, e.g., the "Cassava Song," which came in the 1980s written by Flora Nwapa (1986). The "Cassava Song" is a protest against the import of the staple crop rice and a request to remain with the traditional African cassava crop (Baldermann et.al, 2016). Such type of initiatives or ways to promote and preserve traditional food can be beneficial across Asian nations, due to the diversification which is present in Asia. This would also help the local communities, preferably the tribal communities to get into the mainstream and they can also help disseminate the knowledge in regard to better production of the crops, this might also help them to produce more traditional crops and earn profits from the markets.

Box 7: Case studies

Traditional Root Crops- Java, Indonesia

In the Yogyakarta community of Indonesia, Centre for food and nutrition studies University of Gadjah Mada (UGM) documented information about the traditional food which is highly linked to cultural and religious sentiments of the people in the region. The local roots came out as the most consumed food, basically these roots were lower in energy and carbohydrates but were rich in other essential nutrients required for a healthy diet unlike rice. In this context the institute made the community aware about the nutritional value of their traditional roots like Cassava and Sweet Potato and another balanced food pyramid called tumpeng which is prepared during festivals and is similar to Asian diet pyramid.

This resulted in reduced consumption of rice which is the cause for diabetes and heart diseases along with it also gave healthy, nutritious and sustainable alternative to non-balanced and unhealthy diet.

Barriers: The current changes in diets and lifestyle pattern caused a surged intake of carbohydrate in form of rice over the nutritious traditional food leading to CVD's, diabetes and reduced life expectancy.

Enablers: Awareness and education along with technology had played a major role here.

i. **Awareness and Education:** *School and communities were targeted to provide trainings to students, teachers and nutritionists. Knowledge regarding nutritious cooking, storage, intake, packaging and safety of food had been disseminated to people.*

ii. **Technology:** *A traditional food mapping system was also discovered to integrate various cultural, historical aspects with science and modern techniques, which promoted inclusive growth of community food practices and shift towards healthier diets.*

To read more: *http://www.b4fn.org/case-studies/case-studies/traditional-root-crops/*

8.4. Conclusion

The majority of the Asian countries have a rich cultural heritage of which a major part played is by the food, especially the traditional foods which are treasures of the natural nutrition and healthy diets. As discussed above over the time period with changing consumption patterns traditional foods to an extent have lost thier value especially, with the introduction of fast foods and other easy to prepare or processed foods but still many traditional foods make the major part of our diet. As the world nowadays is suffering everyday through new health challenges like increasing cardiovascular diseases, nutritional deficiencies, lifestyle changes and recent viruses and infections like COVID-19, there is a need for better immunities, a healthy diet and appropriate nutrition levels. This is where the traditional food can benefit the society to cope with such challenges, especially in many low-income countries and highly populated poverty ridden regions across South and south east Asia, where many traditional foods are still included in the daily diets of people, but some have completely lost their values. Redefining and modification of traditional foods can also be very helpful in attaining food and nutritional security. For the same educating the head cook of the family will help to improve the overall nutritional levels of the family. Government should encourage the local people for selling traditional foods, and also incorporate them into the nutritional schemes like mid-day meals in India (for improving child nutrition from the beginning). Bringing in market players with local communities can also help to spread the importance and consumption of traditional foods not just among the adult but the young generations for a better future.

CHAPTER 9

9. Fruits and Vegetables

9.1. Overview

Fruits & Vegetables are essential for a balanced diet, however most of the planet's population consumes the above in minimal proportions. The majority of people do not consume sufficient fruits and vegetables. To obtain health as well as nutritional benefits, the World Health Organization (WHO) encourages taking at least 400g each day. In 2017, 3.9 million fatalities were attributed to a lack of fruits and vegetables over the world (WHO, 2019). The UN has declared 2021 as the International Year of Fruits & Vegetables to enhance consciousness of the health as well as the nutritional importance of fruits and vegetables, as well as their significance to the a balanced diet & lifestyle.

Fruits and Vegetables are often the first food products that come to mind when we think of eating healthy- vitamins, minerals as well as fibre-rich, these are essential for the proper functioning of the human body. Fruits and vegetables (F &V) have numerous health benefits when consumed as part of a balanced diet. Fresh F&V items are valuable not just to the consumers but rather to the food system in general. F&Vs are perishable products, which can result in significant food wastage throughout each and every stage of the value chain, beginning at the farm. Because many F&Vs are consumed undercooked or raw, they may pose a risk of foodborne illness from pathogen contamination as well as food safety concerns from chemical contamination (FAO, 2020). As a result, it's critical to consider the F&V sector as a whole as an integral part of the food system, not just for nutritional reasons, but also for environmental, social and economic reasons. F&V can be made more affordable, available and accessible by a variety of actors.

To meet various combinations of environmental and health goals, researchers have indicated intake ranges of 300-600g per day, 200-600g vegetables and 100-300g fruits (Willett W, et al., 2019) (Herforth A., et al., 2019), suggested that adults should consume at least 400g of fruits and vegetables per day. According to the World Health Organization (WHO), the national food-based dietary recommendations translate into specific suggestions to consume a variety of portions of fruits and vegetables each day. Furthermore, fibres in fruits and vegetables have been demonstrated to lower intestinal passage frequencies by producing a bulk, resulting in more gradual uptake of the nutrients (Anderson et al., 2010) and therefore reducing constipation. Several studies have emphasized the cardiovascular risk uncertainty and the potential of F&V, finding that their consumption was strongly linked with reduced risk of cardiovascular factors like blood pressure (BP), triacylglycerol, preventing early cardiovascular diseases as well as cholesterol (Adebawo et al., 2006).

F&Vs are vibrant, delicious and nutrient-dense foods that are frequently most appealing when picked at their optimal maturity. Most F&V, on the other hand, grow exclusively in specific places of the world, under specified environmental conditions, and at specific times of the year (Rickman et al., 2007a). They also contain more than 90% water and after harvest, begin to respire at faster rates, resulting in moisture loss, quality degradation, and probable microbial spoiling. Freezing, drying, juicing and canning are all examples of storage and processing techniques that help to turn delicate products throughout the year. (Rickman et al., 2007b) Observed that over the last century, a significant amount of peer reviewed studies have been published on the impacts of storage, processing and cooking on the nutritional properties of the fruits and vegetables. Because both processed and unprocessed F&Vs must travel and store, the nutritional loss is to be expected prior to the consumption. Vitamin C (ascorbic acid) retention is frequently employed as a proxy for total nutrient retention in foods; nevertheless, ascorbic acid is by far the least stable component throughout processing, as it is highly water-soluble and susceptible to both heat treatment and oxidation (Ibid). During heating and processing, other minerals and

vitamins, and dietary components are substantially more stable.

Developing countries, "on the other hand, continue to be the largest suppliers of fresh exotic fruits and vegetables to the developed nations". Most "emerging countries, such as Asia (China) and South America, have seen a significant rise in fruits and vegetable production. Asia is the world's biggest vegetable producer, with a 61% in total output and a 51% annual growth rate". However, with grapes, tomatoes, and oranges, the US continues to top the world in fruits and vegetable exports. Brazil continues to dominate the frozen orange juice concentration business, but Chile has emerged as a leading fresh fruit exporter, accounting for 45% of the total output (Ibid).

According to the available data, the average fruit and vegetable intake is not positively related to a country's economic status, "as developing countries such as Uganda and China consume more than developed countries such as Germany, Denmark as well as France." According to the GEMS/Food cluster diet, the average fruit and vegetable intake in the US is 189.30g/day and 255g/day, respectively and adults have fruit and vegetables about 1.1 times & 1.6 times per day (CDCP, 2013). In Hong Kong, fruit and vegetables are consumed at a rate of 146.81g/day and 176.96g/day, for the total of 324g/day (2010). In Malaysia, the average fruit and vegetable intake was 179g/day and 133g/day, respectively (Izzah NA et al., 2012).

The South Asian region, which includes India, Maldives, Nepal, Pakistan as well as Sri Lanka accounts for almost a quarter of the world's population (Shaheen I, 2013). Dietary patterns which are high in carbohydrates and saturated fat intake and a poor intake of fruits and vegetables in particular contribute considerably to the high incidence of Non-Communicable Diseases (NCDs) (Gopalan HS, 2018).

South Asians consumed between 0.1 and 2.61 servings of fruit per day, irrespective of gender. In 23 of the 26 studies, there has been a consistent pattern of fruit eating, with less than 2 servings per day. Bhutan (WHO, 2004), Kolkata, India 2015-16 (Radhika G, et al., 2008), and Nepal (WHO, 2005), were the three studies that revealed both males and females eating more than 2 servings of fruit each day.

The lowest documented fruit consumption by both women and men was 0.43 servings/day (Jayawardena R, et al., 2013), whereas Bhutan recorded the highest consumption of 2.4 servings/day. Except for a few instances, men reported noticeably higher fruit intake than women in Bangladesh (WHO, 2010). Bangladeshi women consumed the least quantity of fruit (0.1 serving/day) (Kanunguskkasem U, et al., 2009), whereas Indian women consumed the most (2.61 servings/day) (Rathi N, et al., 2017).

South Asians consumed 0.9 to 4.0 vegetable servings/day, with the lowest value in Tamil Nadu, India (WHO,2008), & the Maldives (WHO, 2011), and the highest value in Bhutan (WHO,2014). Only Bhutan and Sri Lanka have recorded daily intakes exceeding 3

servings in both genders. When both women and men were taken into account, "Indians from Tamil Nadu had the lowest intake (0.9 servings/day)". When gender specific data was taken into account, the Maldives (WHO, 2011), reported low vegetable consumption in servings/day, 0.9 for females and 1.1 for males, while Bhutan indicated the highest 4.0 for men and 3.5 for women (WHO, 2014).

The Global "Burden of Disease Study, which included people from 113/187 countries and accounted for 82% of the global population, found that low intake of fruits and vegetable is responsible for 14.6% and 7.6% of CVD mortality respectively, with India having the highest absolute death rate of 11.6% (Miller V, et al., 2019)."

Despite the great distribution all across the region, South Asians have a poor daily intake of F&V due to a variety of factors including limited purchasing power, seasonal patterns in the market prices and a lack of social consciousness (Jayawardena R, et al., 2013). According to many nations' specific statistics, just under 4% of South Asians take the WHO-recommended daily intake of at least 400g/day of fruits and vegetables (Hall et al., 2009).

F&V production around the world faces inadequacy due to the perishability of the product as well as the consumer demand. However, Asia has been reported to face yield gaps of more than 80% (Dijkxhoorn, Y., et al., 2021) which indicates highly inefficient production. While production was already lagging, the onset of Covid-19 also acted as a major barrier to propelling yields with production rates dropping significantly. South Asia bearded a significant brunt of this with its significant arable land. It was reported that Bangladesh, which received a supply of 8500 tons of vegetables, saw this number drop drastically to 200-300 tons (Khan et al., 2020). India saw a similar decrease in F&V produce as well. Moreover, this drastic change in supply also led to inflated prices for consumers and lesser profits for producers.

9.2. Barriers

The consumption of fruits and vegetables is well-acknowledged to be a necessary prerequisite for a healthy diet. Yet, a glaring inadequacy is seen in consumption patterns. Especially when it comes to the "developing" parts of Asia, these numbers drop further due to the popularly cited income effect seen in these primarily low and middle-income countries of the region. However, like any other developmental concern, this issue too has layers to it which must be understood in conjunction to suggest and implement effective interventions for the same.

A study conducted to understand F&V consumption issues in low and middle-income countries (including Bangladesh, India and Nepal) revealed that contemporary marketing channels pose sourcing and transportation risks by means of post-harvest risks, high wastage, mediating costs, lack of traceability and standardized quality testing. Another obstacle is that there is a vast gap between consumers and producers in terms of information exchange and geographical locations. This places the onus on agents and traders instead. Food safety is also an upcoming concern with regard to fresh produce. Thus, mere appearance is not the sole factor for informed consumers and they look for products free from toxic residue. This fact is corroborated by the rising popularity of organic food around the world. Another aspect of food safety is proper means of storage which protects the product and is beneficial to producers in terms of better shelf life as well. Unfortunately, South and Southeast Asia are still struggling with this aspect as lack of proper storage is leading to aflatoxins in crops due to the moisture in the air. Such hazards are also one of the major reasons behind the food-borne diseases prevalent in the region (Jaffee, et al., 2019), decreasing the consumption.

Lack of knowledge about proper packaging also limits the trading potential for the F&V producers. At the tail-end, informal supply chains always run the risk of harvest losses due to variability in processing. A limitation for better understanding the success of existing supply chains is the street vendors/community

markets, which still dominate many South Asian countries. The consumption inequality in South Asia remains a fact and income are not the sole differentiator between consumers. For instance, a study revealed how women in India were consuming lower levels of F&V than their household members due to social pressures, systemic inculcation of consuming less etc. (Kehoe S., et al., 2019). Similarly, a study analysing the National Survey data of India identified consumption trends which revealed that tribal communities were consuming fewer amounts of F&V (Choudhary et al., 2020). Hence these differences need to be addressed in term of F&V consumption across Asia.

9.3. Enablers

Fruit and Vegetable consumption is surrounded by many barriers and norms. The purchase is highly bounded by the economic status and many other factors, making it difficult for it to reach the low- income households. Though, there are barriers there also have been some enablers which have led to the growth of the sector. To analyse what can be done and what is the reason for the successful consumption patterns, the enablers have been divided into 4 broader categories of policy, technology, business, capacity building and awareness.

9.3.1. Policy

Government support via policies and initiatives proves to be a great enabler. One example of it is, in a business and residential area within Tokyo known as Adachi Ward the government runs a type 2 diabetes countermeasure programme called “Eat Vegetables Daily”. This programme aims to strengthen environmental interventions for the communities of the area. As part of this programme collaboration was made between the government and nearly six hundred local restaurants and retail outlets within which, “vegetable-rich” meals were served to customers. To be certified as a partner in this programme, shops must serve a highly vegetable-rich meal which has at least 120 grams of vegetables in a single serving excluding potatoes. In India the policies like Mega food park scheme, Cold chain value chain addition and Preservation Infrastructure Scheme and cold storage and fruit and vegetable programme which involve the construction of cold storages and ice plants for the produce at various locations in between farm and market and also in the market are few successful examples which are involved in increasing the production, processing and consumption of fruit and vegetables. The use of fruit and vegetables in India has also been promoted in younger generations via the mid-day meal, Anganwadis under the ICDS programme (Khandelwal et.al, 2019). Though there is a long way to go and government should use qualitative and quantitative research and bring new ideas to improve efficiencies and reduce wastage and create a healthy market competition for F&V not just as a high-value crop both economically but also nutritionally (Khandelwal et.al, 2019).

9.3.2. Technology

One of the main issues related to F&Vs is the post-harvest losses and a high number of wastages, due to a lack of better processing and storage facilities. Technological advancement thus is very helpful for the F&Vs, e.g., the development of smaller and portable cold storages, which is helping small and marginal farmers for providing higher shelf-life to their F&V's. Currently, active packaging is successfully applied to improve the shelf life of blueberries and the table grapes. However, active packaging can be done with red thyme oil (Thymus vulgaris L.), which can be used in the citrus industry to extend the shelf-life of lemons and oranges for further processing in various forms before getting wilted. (Pace and Cefola, 2021). The fruit and vegetable sector has a high scope of processing as the fruits can be used not just as raw but also in various forms like jams, custards, jellies etc., which requires high-level processing techniques. Technological innovations in this industry can be used for many purposes, like advanced cold chain monitoring throughout all the stages of the supply chain. Technology has introduced the online platforms like big basket, grofers etc. which not only present an easy and efficient way of buying but also increase the information and knowledge about the nutritional benefits of F&V's which will eventually increase the consumption of the F &V's.

9.3.3. Business

The market is essentially a major player in terms of F&V consumption as well as production. In terms of production with the help of government support F&V's production has improved a lot in the last decade. Programes like Mission for Integrated Development of Horticulture, which not only focused on providing seeds, technology to the farmers for production of F&V's but have also made the market value chains efficient by setting up of cold storage and processing units. This has also triggered the supermarkets and grocery stores to sell F&V's as now they can easily store and preserve even the commodities with smaller shelf-life.

Discounts and does support the consumers' willingness to pay, and therefore discounts are very important for better sales. The F&Vs as we know are consumed in many ways, hence regular innovations should be kept going to make it taste better and as easy as consuming some sort of fast food from a stall which would help in increasing the consumption of F&Vs.

9.3.4. Capacity Building and Awareness

Awareness and education is a factor which has been helpful for increased consumption of F&Vs among urban low-income households and especially among the younger generations. To attract and promote more consumers to buy F&V, providing Point-of-purchase (POP) information at food stores could be used as a tool. To test its effectiveness a study was conducted at stores in Japan to determine the impact of point of purchase health information being provided in the promotion of vegetable and fruit consumption patterns. As computer systems have developed rapidly in the past decade point of sales system utilization has also widely improved in many parts of the world. One such place in Asia where this practice is widely used is Japan. This helps track the purchase patterns and determine changes in purchase patterns. This analysis carried out with the help of the Point of Sales System revealed that the provision of similar health information in stores can be used as an effective tool to encourage the purchase of fruits and vegetables.

This is especially effective as usually purchased vegetables and fruits are consumed by the customer or close relatives, hence providing an incentive to purchase healthier options. It is seen that providing a point of purchase health information can lead to a healthy behaviour modification promoting increased consumption of healthier diets.

Box 8: Case studies

Promoting horticulture practices among tribal population, Manipur (India)

Central Food Technological Research Institute (CFTRI), Mysore started an initiative to promote horticulture among the tribal areas of Manipur by introducing fruit processing technologies and use perishable fruits which are produced by the tribal people which will help them to sell their produce and earn money to create better economic conditions helping in combating the food security among the tribal people. The introduction of new processing technologies not only saves the energy but also reduce the transportation cost and wastage of the fruits during the storage and shipping period which eventually will help in improving living conditions of the people in the region via such activities. The pilot plant is made to be operating for 300 days/ year, and focuses on the fruits like orange, passion fruit, pineapple which are easy to process and hence will generate more income for the tribal communities/ farmers. This technology will enable approx. 20% utilization of various fruits and vegetables throughout the year, which will help with the income generation for farmers throughout the year.

Barriers: The lack of awareness, education and technology poses challenges in terms of consumption of F&V. The changing dietary patterns are also changing and are focused more towards the fast foods which seems easy to consume and also are cost efficient to buy in comparison to fruits.

Enablers: The local production of fruits will reduce the product cost of the processed fruit product making it affordable and aacessible for low-income households as well. Technology and capacity building have proved to be the enablers for this project.

i. **Technology:** *The R&D in the technology is really very important as done by the CFTRI, the processing machine and its installation enabled the tribal people to earn something from the subsistence farming they were doing. Connecting these farmers via information technology or digital platforms would also be helpful and can be used as a tool to expand their reachability. This will not only ensure income for tribal people but also will increase the fruit consumption in form of juice and other processed products in the surrounding areas and even among the community itself.*

ii. **Capacity building and Awareness:** *Another enabler is the awareness and capacity building among the tribal communities/farmers about how they can earn via their produce. Training programme for the youth tribal population about machines and processing and benefits of consumption of fruits will help the upcoming generations to be more aware about what they are growing, consuming as well as selling. The training programme and education also helps to motivate the youth and others to innovate new technologies or ideas which could help for better farm to fork connectivity along with ensuring income generation which in turn will strengthen the food and nutritional security.*

To read more: https://apaari.org/wp-content/uploads/2009/05/ss_2008_01.pdf

9.4. Conclusion

Fruits and vegetables are an essential part of a balanced and nutritious diet. Their importance is more prominent in South East Asian and South Asian countries as a large portion of the population depend on homegrown and easily accessible sources of nutrition. But from studies it can be seen that the daily intake of F&V in Asian countries, especially in South Asian countries is not up to the required level. A variety of factors play a role in this trend, one of the most significant ones being purchasing power. Studies also show that females and other marginalized groups are more disadvantaged in this regard as most regions reported a lower F&V consumption among them. The key drivers and enablers identified through this study include factors about production, supply chains and consumer perception as well as consumption inequality. Understanding the drivers and enablers controlling fruit and vegetable consumption patterns will help us devise strategies to improve F&V consumption among communities. Reviewing case studies revealed that some of the most effective strategies to improve F&V consumption without affecting the supply chain or purchasing power include providing point of sales health information regarding the benefits of increased F&V consumption and initiatives incentivizing the customers by very small amounts for ordering a vegetable and fruit rich dishes. Both the strategies rely on providing positive feedback to customers when adopting a healthier consumption pattern. Implementation of similar initiatives can vastly improve F&V consumption within all regions and bring about a healthier generation for the future.

CHAPTER 10

10. Conclusion

The food consumption pattern is influenced by various biophysical as well as socio-economic factors (**Figure 5**). In Asia, policies play an important role in influencing the eating habits. For instance, subsidies offered by the Government in countries like Bangladesh, India had driven changes in food preferences and dietary patterns. Institutional support is indispensable in improving the sustainability of the dietary pattern. The analysis of the countries in South Asia reveals that the dietary pattern in these countries differs significantly across the region. However, most of them either over-consume or under-consume with respect to the Eat Lancet's Healthy diet. Protein intake still remains lower than the recommended values while carbohydrate intake is very high, especially in the urban areas. F&V are an essential part of a balanced and nutritious diet. Their importance is more prominent in South-east, East and South Asian countries as a large portion of the population depend on homegrown and easily accessible sources of nutrition. However, the daily intake of F&V in most Asian countries is below the recommended daily intake. Traditional foods not just form the cultural heritage of the countries and thier people but also, they are one of the most valuable treasures of natural nutrition and healthy diets (Kumar and Mollick, 2021). The increasing presence of transnational food corporations has made cheaper and low-quality processed food accessible even to the lower income households. Such trends could lead to high consumption of sugars, carbohydrates and fats which are the root causes of a number of non-communicable diseases (NCDs). NCDs are on the rise in most parts of Asia, especially in urban settings. In spite of the introduction of fast foods and other easy to prepare or processed foods, many traditional foods still make the major part of our dietary pattern in many other countries in over South, South-east and East Asia where many traditional foods are still included in daily diets of people, but some have completely lost their values.

Traditional food may be healthier from nutritional value. However, the nutritional composition of the food is not the only factor that defines how healthy and sustainable the food is. Traditional food prepared with a large amount of fats, salts and sugar in an unhygienic way may not be the healthiest food choice. For instance, there is an increasing trend in food away from home (FAFH) across Asia. There is a huge variety of FAFH, from low-cost street food to high end restaurants that caters to the need of different social groups. As income level increases, the household tendency to consume FAFH increases and often unhealthier FAFH. Thus, the question, "would income rise lead to a more secure food?" arises. Unfortunately, in the current scenario we see an increasing trend of such unhealthy and unsafe food. There is a therefore a need to bring behavioural change in communities toward sustainable consumption patterns. One of the key drivers of food consumption patterns is the behavioural aspect and our perception of various food types. Urban agriculture is an emerging practice in many parts of Asia which provides a wide range of functions such as economic revitalization, effective city supply chain, community engagement, waste management, energy conservation, biodiversity etc. This contributes towards securing features of various sustainable development goals and healthy development of localised food systems especially in urban and peri-urban regions.

A variety of factors influence the consumption pattern (**Figure 5**), one of the most significant ones being purchasing power. Generating awareness and training and capacity have played an important role improving the food intake. Further, females and other marginalized groups are more disadvantaged. Understanding the drivers and enablers controlling the consumption patterns will aide in formulating strategies to improve consumption patterns that is healthy for the humans as well as sustainable for the environment.

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ANNEXURES

Annexure 1: Focused Group Discussion Participants

Table A1: Focussed Group Discussion (FGD) 1 : Food consumption pattern among the low income group in Asia

Sl No	Participant Name	Country
1	Mr. Muruganandam Muthiah	India
2	Ms. Bhargavi Nagendra	India
3	Mr. Varun Deshpande	India
4	Dr. Kiran Bains	India
5	Dr. Tek Gurung	Nepal
6	Mr. Amar Thing	Nepal
7	Dr. Tilkavati Karupaiah	Malaysia
8	Ms. Heng Tola	Vietnam
9	Mr. Kang Menghai	Cambodia
10	Dr. Koh Chanrithisak	Vietnam
11	Dr. Toun Sampos	Vietnam
12	Dr. Abul Hossain Sheikh	Bangladesh
13	Dr. Ratna Nazmun	New Zealand
14	Mr Tsubasa Enomoto	Thailand
15	Ms Lixia Zheng	China
16	Dr Chubamenla Jamir	India
17	Dr Fawzia Tarranum	India
18	Ms Garima Singh	India
19	Ms Charvi Kapoor	India
20	Ms Lizza talukdar	India

Table A2: FGD 2: Food Consumption Pattern Among the Low-Income Households in Asia Part 2: Dietary pattern, drivers and barriers.

Sl No	Name	Country
1	Dr. Kiran Bains	India
2	Dr. Tilakavati Karupiah	Malaysia
3	Dr. Zaffar Mehmood	Pakistan
4	Dr Sapna Narula	India
5	Mr. Muneer Ahmed	India
6	Dr. Nazmun J	Bangladesh
7	Dr. Bhavani Shankar	India
8	Prof. Xiaojie LIU	China
9	Dr. Yan SHI	China
10	Mr. Huiyu OUYANG	China
11	Ms Garima Singh	India
12	Ms Charvi Kapoor	India
13	Ms Lizza talukdar	India
14	Ms Lixia Zheng	China
15	Dr. Chubamenla Jamir	India

Table A3: FGD 3: Role of youth and transforming dietary pattern in low income households in Asia

Sl No	Name	Country
1	Mr. Kapil Mandawewala	India
2	Mr. Deepak singh	India
3	Mr. Abhijeet Kumar	India
4	Mr. Mrigank Shah	India
5	Ouyang Huyiu	China
6	Dr. William Ng See Hoe	Malaysia
7	Mr. Dishant	India
8	Mr. Praveen Kumar Musaida	India
9	Mr. Qasim Khan	Pakistan
10	Ms. Nan Sang	Myanmar
11	Mr. Vikram Pandey	India
12	Ms Garima Singh	India
13	Ms Charvi Kapoor	India
14	Ms Lizza talukdar	India
15	Ms Lixia Zheng	China
16	Ms Kashfi Jamal	India
17	Dr. Chubamenla Jamir	India

Annexure 2: Regional Dialogue Participants

Table A3: List of Participannt in the Regional Dialogue who contributed as moderators and resource persons. The list of all those who attended and participated in the discussions are not listed here.

Sl. No.	Name	Organization	Country
1	Bandana Shakya	International Centre for Integrated Mountain Development (ICIMOD)	Nepal
2	Benoit Sauveroche	Delegation of European Union to India	
3	Bhargavi Nagendra	Socratus Foundation	India
4	Bhavani Shankar	University of Sheffield	UK
5	Charvi Kapoor	TERI SAS	India
6	Chubamenla Jamir	TERI SAS	India
7	Diwakar KC	Griffiths University	Australia
8	Fawzia Tarannum	TERI SAS	India
9	James Sangma	Minister of Food Civil Supplies & Consumer Affairs, Forests & Environment, Health & Family Welfare	India
10	Kiran Bains	Punjab Agriculture University	India
11	Liu Xiaojie	Chinese Academy of Sciences	China
12	Lizza Talukdar	TERI SAS	India
13	Michael Bucki	EU Delegation to India and Bhutan	
14	Mushtaq Memon	EU SWITCH-Asia RPAC	
15	Nazmun N. Ratna	Lincoln University	New Zealand
16	Prateek Sharma	TERI SAS	India
17	Ram Pyari	Ministry of Women and Child Development, Rajasthan	India
18	Sapna Narula	Nalanda University	India
19	Shaleen Singhal	TERI SAS	India
20	Shi Yan	Farmer Shared Harvest Organic Farm	China
21	Tilkavati Karupaiah	Taylors University	Malaysia
22	Ugyen Yangchen	Royal University of Bhutan	Bhutan

ANNEXURE 3

Table A: Regional Patterns of Consumption In South Asia, South East Asia

Region	Country	Main Ingredients (Primary and Secondary)	Traditional Meal and drinks	Cooking Techniques Used	Source	Citation
South Asia	Sri Lanka	▪ Rice (white, red and black rice) ▪ Leafy vegetables ▪ Spices (cinnamon, cardamom, and cloves, while pepper, nutmeg, and gamboge) used both as flavoring agents and fortherapeutic properties	▪ Variety of leafy greens consumed as herbal beverages and herbal porridge. The herbal porridge is considered as an all-in-one breakfast where rice gruel is incorporated with minced leaves and other greens.	▪ Boiling ▪ Steaming ▪ Fermenting ▪ Dehydrating ▪ Preserving	▪ Rich biodiversity as a result easy access to several endemic as well as nutritious fruits and vegetables and many types of different plant- based food material across the island	Prakash et al., 2020 Bandara et al., 2021
		▪ Fruits and vegetables ▪ Roots and tuber crops (other thanrice an important source of carbohydrates) ▪ Millet, a commonly consumed grain (finger millet, foxtail, and proso millet)	▪ Main meals of lunch and dinner consist of rice and curry- based diets. A typical meal comprises a large portion of steamed/cooked rice served with two or three vegetable dishes in the form of curries mostly cooked in coconut milk, seasoned with local spices and condiments and leafy green vegetables. Fish, meat, or dried fish(anchovy is most widely consumed) may also be included. Local yams, local pulses and tubersare also popular choice. Dessert consists of local fruits along with traditional sweets.			
	Bangladesh	▪ Wetland products- rice and fish,are traditional favorites ▪ The common vegetables are potato, cauliflower, cabbage, tomato, beans, peas, carrot, radish, pumpkin, eggplants, bittergourd	▪ In rural Bangladesh-Panta bhat (semi fermented plain boiled rice soaked overnight in water) is consumed with salt, onion, and green chili. In Urban Bangladesh handmade ruti/ bread (wheat flour based) mixed fried vegetables, eggs, and tea is consumed. In winter's traditionally muri or cheera or khoi (puffed/ flattened/ popped rice) is preferred with milk or yogurt and gur/jaggery	▪ Mashed ▪ Fried ▪ Cooked ▪ Fermented ▪ Dried	▪ Subtropical monsoon climate of Bangladesh favors the production of a wide variety of fruits ▪ Deltaic plains &an array of waterbodies conducive for rice production, and diverse fish variety.	Prakash et al., 2020
		▪ The famous fish species include rui (Labeo rohita), catla (Gibelioncatla), mola (Amblypharyngodon mola), tengra (Mystus tengara), kachki (Corica soborna), puti (Puntius sophore), taki (Channa punctata), bombay duck (Harpadon nehereus)	▪ Lunch and dinner- rice, curry, vaji(fried mixed vegetables or leaves), bhorta (mashed potato or vegetableor dry fish), and dal. Curry is a staple dish where fish, meat, and vegetables are cooked with a blend of spices and herbs. Bhorta (Alu bhorta,begun bhorta,shutki bhorta) is made from smooth, fiery, and flavorful mashed veggies or fish either fresh or dry, made with mustard oil, onion, garlic, and red or green chilies to enhance smell and delicacy.			
	Bangladesh	▪ Spices and herbs such as garlic, ginger, lime, coriander, cumin, turmeric, and chili ▪ Mango, banana, papaya, jackfruit, pineapple, guava, lychee, pomelo, and lemon	▪ Rice Beer is a traditional drink			

Region	Country	Main Ingredients (Primary and Secondary)	Traditional Meal and drinks	Cooking Techniques Used	Source	Citation
South Asia	Nepal	▪ Rice is a staple ▪ Paddy, maize, wheat, buckwheat, barley, and millet arethe main cereals cultivated	▪ Meal of pulses, rice and vegetables (dal-bhat-tarkari) with a seasonal vegetable or fruit pickle, milk, curd/buttermilk and meat as a non-vegetarian accompaniment and wheat roti is consumed twice a day.	▪ Steaming ▪ Boiling ▪ Fermenting ▪ Stir-frying		Prakash et al., 2020
		▪ Rich variety of fruits and vegetables are grown and consumed ▪ Cereals, legumes, fruits and vegetables, milk, meat and fish are all used to prepare non alcoholic and alcoholic fermented foods	▪ Mountains where rice is unavailable, boiled maize or milletflour (dhindo/dhinro) is eaten. About 105 traditional foods with 24fermented foods (used as curries, side dishes, beverages, snacks) exist. Momos are a local delicacy which has become widely popular.			
	India	▪ Wide variety of food grains (cereals, millets, and pulses), fruits, vegetables, and oilseeds aregrown	▪ Traditional meals are generally different representation of basic ingredients and vary by geography.North and north- west Indian meals	▪ Boiling ▪ Steaming ▪ Fermenting ▪ Dehydrating	▪ Regional culinary diversity is indicative offoods grown	Prakash et al., 2020
		▪ Vegetable's like okra, a variety of gourds, eggplant, snake beans, various leaves, potato, and tapioca/cassava.	▪ Wheat and bajra/makka/ragi as main cereal (for chapati) whereas south and east cultures are more rice-based. There is also a heavy influence of Mughlai culture in the North and Chinese and Mongoloid food traditions in the East. West Indian meals have lentil-based curries owing to lesser fresh vegetables traditionally available. Traditional meals are also based upon the pattern of a "thali" with many lentils, vegetables and milk based dishes, fermented food and rice/wheat as the cereal component. Coastal regions and also, those in the Northeast of India include fish- based curries in dishes. Here meat consumption is also prominent, with many Christian populations having traditional pork dishes	▪ Preserving ▪ Frying ▪ Tandoor ▪ Drying ▪ Pickling ▪ Salting	▪ Locally according to the terrain, climate and geography.	
			▪ Milk, curd, eggs, poultry, meat, and fish are important components ▪ Fruits are usually consumed fresh and include mangoes, tamarind, plantain, papaya, and those available seasonally. Traditionally the processing of ripened fruits is rare.			
	India	▪ Sesame, peanut, mustard, coconut, and other vegetable oils are generally used for cooking. Spices used include coriander seeds, asafetida, cumin seeds, mustard seeds, fenugreek seeds, cinnamon, clove, ginger, pepper, chili, garlic, turmeric, saffron, and cardamom	▪ Desserts made from milk, sugar, rice, or split legumes, using clarified butter (ghee), nuts, and spices such as cardamom, nutmeg, and mace			

Region	Country	Main Ingredients (Primary and Secondary)	Traditional Meal and drinks	Cooking Techniques Used	Source	Citation
South East Asia	Thailand, Lao PDR, Vietnam, Indonesia, Malaysia, Myanmar, Philippines	▪ Rice is the staple of South East Asia, with the indica variety (jasmine rice) largely grown in Thailand, Cambodia, and Vietnam. In these countries and also, Lao PDR, glutinous rice is highly coveted and consumed.	▪ Corn on the cob is a popular street snack; corn also used to make desserts or used as cornstarch to make noodles. - a staple meal consists of boiled rice, lightly steamed vegetables and a side of fish or meat, and also, tamarind/coconut-based broths in most South East Asian countries. Fermented fish is also served as a dish or smaller fish as accompaniments with rice in Lao and Khmer, Vietnamese and Thai traditions. ▪ Meat is rarely the	▪ Boiling ▪ Vegetables are usually stir fried, steamed or eaten raw ▪ Fermentation for fish and vegetables is widely practiced ▪ Sun drying and preparation of raw dishes ▪ Grilling especially for meats.	South East Asians raise fish in ponds or rice field near their homes or source fish from nearby rivers or streams. Vegetables and herbs are sourced from household gardens or local markets. Locals also collect many popular foods from forests. Reciprocal relationships in food exchange also exist.	Esterik, 2018
		▪ Roots, tubers and corn provide bulk nutrition as starchy foods to marginal communities.				
		▪ Soy products such as soy sauce, paste, tofu and tempeh are widely consumed throughout South-East Asian cultures.				
		▪ Protein is majorly sourced from aquatic foods - freshwater fish, seafish and shellfish and Snakehead, catfish, and mackerel are popular fish. Fish sauce is another crucial ingredient. Fish sauce is another crucial ingredient.	▪ Central focus of a meal and is consumed in smaller portions. Also, most Southeast Asian cultures make use of all parts of the animal consumed in different dishes and delicacies. - Spices and herbs are blended to make flavour pastes majorly used in stir-fry dishes, soups, and curries.			
		▪ Greens, vegetables and herbs are widely used, for eg. water spinach, eggplants, banana blossoms, bitter melon, lotus, bok choy, rapini, napa cabbage, sweet potato, green onions, Chinese chives, bean sprouts, onion and garlic for flavoring.				
		▪ River weed, a variety of algae, is also popularly used in Laotian, Filipino and Thai cuisines.				
		▪ Chicken, pork, duck and beef are usually consumed as meat; rural communities may also rely on other smaller animals like squirrels and wild birds. Insects are also consumed				
		▪ High use of spices and herbs - for instance - cloves, cinnamon, nutmeg in Malaysian and Indonesian dishes and garlic, salt, shallots, ginger and chillies are used throughout. Also used are lemongrass, turmeric root, wild limes, tamarind and star anise				
		▪ Fruits are widely consumed - coconut, mangoes, banana, variety of citrus fruits and jackfruit				

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