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Nutrition Security: Role of Sustainable Food Systems in Eliminating the Triple-Burden of Malnutrition

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Abstract

Some people do not have enough food, while others are eating too much. Malnutrition in all forms, undernutrition, overnutrition and diet-related diseases is one of the leading causes of death worldwide. Food produced in one part of the world is being wasted causing grave environmental impacts, while in another part there is lack of food for consumption leading to hunger. Rapid global population growth with an increase in demand for food is straining the health of the planet. These problems coexist and plague the world. An all-encompassing solution to these challenges is to make the food systems sustainable. Food systems have the potential to nurture both planetary and human health, but the present food systems are threatening both. Achieving a universal healthy population from healthy diets and sustainable food production should be the global public health goal. The transition to sustainable food systems requires moving from an agriculture centred food system to policy and research framework. Food and Nutrition Security should spearhead the transition since it is both a precursor as well as an outcome of sustainable food systems. This paper discusses all these linkages in detail and also looks at how the triple burden of malnutrition can be eliminated by sustainable food systems in the Indian context.

Keywords: *Food Security, Public Health Nutrition, Food System, Malnutrition, Sustainable, Nutrition Security, Hunger, Food Waste*

1.0 Introduction

Increasing urbanisation along with population growth has led to a rise in the global demand for food. The current local and global food systems face pressing challenges that require urgent attention. The ultimate aim of the food systems should be not just to provide food security for all, albeit that has been the goal ever since human civilization, but because of the unprecedented development there is a requirement of more environmentally sensitive and perhaps sustainable solutions for food and health. Food and Nutrition Security for all while minimizing the carbon footprint that intensive food production leaves behind globally should be the new objective. The conventional food systems need a resetting from farm to fork to promote livelihoods, food structures, provide dietary energy with adequate nutrients and calories at an affordable cost, accessible for the global population while also being equitable.

As per the Food and Agriculture Organisation's report on 'The state of food security and nutrition in the world', in 2018 approximately 821 million people worldwide suffered from hunger owing to insufficient calorie intake (*The State of Food Security and Nutrition in the World 2020 | FAO | Food and Agriculture Organization of the United Nations, 2018*), and 2 billion people did not consume adequate nutrients required while at the same time about 2 billion consumed excess calories and thus were either overweight or obese (*2018 Global Nutrition Report - Global Nutrition Report, 2018*). This new inexplicable situation is the “**triple burden of malnutrition**” that affects all the countries of the world to varying degrees. At the same time, approximately one-third of all the food produced for human consumption is lost every year, not eaten—simply wasted, which, if used for consumption could be enough to eliminate global hunger over four times (*Food and Agriculture Organization of the United Nations, 2019*).

In addition, the prevalence of nutrition-related non-communicable diseases has been becoming rampant. Unless the shift in food systems occurs soon, the rates of global hunger and nutrient deficiencies will keep ascending along with the rates of overweight and obesity. The paradoxical crisis of the triple burden of malnutrition coupled with food wastage does not only impact the health of the global population, but it is also severely economically draining too. With the anticipated growth in the world population by 2050 to 9 billion people (Ganesan, 2019), the crisis will only get worse if the current food patterns are not revamped. The overall global food production must increase to meet the increased global population needs to supply food for all,

that has adequate calories and nutrients to ensure food and nutrition security but in a manner that does not compromise on the development of local communities and also does not degrade natural resources.

Food Systems that are sustainable, economically viable, prevent all forms of malnutrition, and are ecological are needed more than ever before. Achieving a universal healthy population from healthy diets from sustainable food systems is a global public health goal that should be realised by shifting the focus from agriculture to food systems policy and research across local, national and global levels.

2.0 Food Security, Nutrition, Food System: Connecting The Dots

The Sustainable Development Goals (SDGs) have the ambition not only to end poverty and hunger by 2030, but also to ensure that “all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (UN 2015b). This is because food insecurity negatively affects human physical, social, emotional, and cognitive development throughout the lifespan. It is also a major social and environmental disruptor with serious repercussions for planetary health. Thus, the issues pertaining to food security, nutrition, health, environment, agriculture are all related to all of the United Nations’ Sustainable Development Goals (SDGs). This puts an apposite focus on all aspects of malnutrition and the food system, and also their connexion.

2.1 Triple Burden of Malnutrition

Food insecurity gets expressed at different points in the lives of people as being underweight and overweight in all parts of the world. The triple burden of malnutrition as undernutrition, overnutrition, and micronutrient deficiency manifests as child undernutrition, anaemia among women, and adult obesity. Many countries experience these different forms of malnutrition simultaneously due to insufficient consumption of calories, excess consumption of calories or consumption of ‘empty calories’ by the populace. What is alarming is that obesity not only affects 2 billion adults, but 42 million (Cather, 2016) children who had been affected with stunting once now have excess fat stored as a consequence of consuming diets high in calories

and low in micronutrients as per a study by United Nations Children's Fund (UNICEF) , World Health Organization (WHO) & World Bank Group in 2016. Also, in 2019 as per WHO 690 million people in the world went hungry (*As More Go Hungry and Malnutrition Persists, Achieving Zero Hunger by 2030 in Doubt, UN Report Warns, 2020b*). At the same time, micronutrient deficiencies such as vitamin A, iron, iodine, zinc, and calcium affect 2 billion people worldwide as malnutrition or hidden hunger (*FAO et al. 2017*). The prevalence of obesity is increasing and so is the associated risk of non-communicable or lifestyle diseases with it, like diabetes, hypertension, thyroid, cardiovascular diseases and also cancer. Evidently, world hunger is not declining and obesity is still growing. These three burdens often coexist within the same community, society and sometimes even households. Diet-related chronic disease are the main contributors to preventable morbidity and mortality. Altogether, almost one-third of the global population has poor health and nutritional status (*Lindgren et al., 2018b*) posing a debilitating effect on their quality of life. An approach to treat and prevent all forms of malnutrition should be adopted that emphasises the need for people to farm, eat local, seasonal and healthy balanced meals along with supplementation, support and subsidies by the governing bodies globally through an appropriate policy framework.

2.2 Food Waste as a Cause and Contributor to Hunger

The United Nation says that one-third of global edible food, that is approximately 1.3 billion tonnes gets wasted and 56% (*Ganesan, 2019b*) of this wastage happens in the industrialised world while millions are starving haplessly in the other part of the world.

The wasted food does not end up overflowing in the landfill or trash cans. A lot of food wastage happens in the kitchen wherein the food prepared goes uneaten or left to spoil in the fridge and cabinets. Almost 56% of the total food wastage happens due to the superficial quality standards that over-emphasise appearance (*Ganesan, 2019b*). Thus, as per the FAO, 40% (*Ganesan, 2019b*) of the losses happen at retail and consumer levels in the industrialised countries. The remaining 44% (*Ganesan, 2019b*) of the food wastage happens at harvest time in the developing nations due to poor harvesting facilities, storage, packaging, distribution and the overall lack of infrastructure. The good, edible, nourishing food is lost in the fields even before it has the chance to reach the hands of the hungry. This loss that occurs at post harvesting, storage and processing levels happens since the farmers do not have the means to access technology, finances and

market sources to avail and thus are forced to watch their crops just rot in their fields or get infested by pests that overrun the crops, failing their laborious efforts and resources.

This conflict and a lack of resources coupled with chronic poverty make food wastage one of the root causes as well as the contributor of hunger in the developing world since all that is being wasted is not rubbish, rather it is good, nutritious food that should be filling starved stomachs.

The food system produces enough calories to feed 10 billion, yet 1.2 billion go to sleep hungry (*Erdman, 2018*) because of the powerlessness of the poor to gain access to the resources they need to feed themselves. This lop-sided situation can be greatly improved by strengthening the supply chain in developing countries, through the direct support of farmers and investments in infrastructure, transportation, along with an expansion of the food and packaging industry to prevent food loss or reduce the food waste. In the developed world, however, consumer behaviour change efforts, public health action and social change can help develop a human conscience to minimise food loss and waste. Also, efforts to recycle waste food as feed, compost, and fertilizer can also prove to be beneficial.

2.3 Environmental Impact of Food Production and Food Loss and Waste

Food production through agriculture is heavily resource-intensive. It is the largest cause of global environmental crises like deforestation, desertification, climate change, damage to coastal reefs and marine ecosystems.

Agriculture uses 50% of all habitable land, 75% of which is used for meat production. 70% of the world's water is used by agricultural production alone (*Ganesan, 2019b*), according to the Global Environmental Outlook report. Also, food production contributes to 30% of the global greenhouse gas emissions (*Vermeulen et al., 2012*). It is also the largest factor threatening species with extinction and has led to about 60% of the world's fish stocks to be fully fished or overfished (*Sustainability, 2019*).

A colossal global environmental change as this increases the risk of irreversible and catastrophic shifts in the ecological systems on the planet. However, it is not just the production of food but also its waste and disposal that adds to the burgeoning burden on the limited resources. Loss from food amounts to a major squandering of water, land, energy, labour, capital resources apart

from producing greenhouse gas emissions thereby, unnecessarily contributing to global warming and climate change. These resources are intensified in producing food, hence the wastage is not merely a mockery of food security but also a sheer wastage of resources. Food losses and waste also impact the sustainability of food systems economically, socially and environmentally. They have negative economic effects, impede development, hinder social progress and undermine food security. Also, valuable nutrients, energy and natural resources are wasted. Thus, currently, agriculture is a victim of shifting environmental conditions while also simultaneously, a driver of global environmental change.

Reckoning the present agriculture and global food systems, it is evident that the ongoing food production is wasteful of increasingly scarce resources and is not sustainable. How the population consumes and produces food needs to be re-thought. Agroecology can be the alternative to agriculture that uses an understanding of the ecosystem to create a more efficient system that optimizes the use of resources by producing more food with less strain on the planet. Reducing food loss and waste can also significantly enhance the sustainability of the food system and concurrently improve food security and nutrition.

2.4 Nutrition Security

Nutrition Security is more than Food Security. Traditionally, food security has only been considered in reference to agriculture, markets and distribution whereas nutrition has been viewed in isolation as a health problem. These two concepts being addressed separately hinders and disconnects the scientific discourses required to solve the gnawing problems related to the environment, society, economics and health which are generated or worsened by conventional food systems. It is only recently that 'Nutrition Security' has come into existence to emphasise the way food is produced, distributed and consumed since all socio-economic issues of poverty, hunger, malnutrition, inadequate diets, land degradation, water scarcity, biodiversity loss and climate change are inherently rooted in the food system.

As per the definition given by the World Bank and Scaling-Up Nutrition (SUN) 2010, "Nutrition Security is achieved when secure access to an appropriately nutritious diet is coupled with a sanitary environment, adequate health services and care, to ensure a healthy and active life for all household members." (*El Bilali et al., 2018b*) So, averting hunger by providing food for all is made obsolete by ensuring food provided is healthy and nutritious for all.

While Nutrition Security places the importance on nutrition for achieving food security, it also maintains the traditional focus on food availability, access, utilisation and stability. This perspective emphasizes that food security is a precondition to adequate nutrition as well as a consequence. Food and Nutrition Security (FNS) presses on the need for greater integration of nutrition and food security in policies, programs and research and considers appropriate levels of nutrition the ultimate goal of food security (*El Bilali et al., 2018b*). These linkages should also intersect at the local, national and global level. The integration of food security and nutrition is a requisite for a sustainable food system.

3.0 Healthy Diet From Sustainable Food Systems

The food production system and our diets play a pivotal role in the sustainability of the food system. A healthy and sustainable food future can be achieved through global collaborative efforts.

According to the FAO, “Sustainable Diets are those diets with low environmental impacts that contribute to food and nutrition security and to a healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources.” (*Sustainability, 2019*)

The goal is to ensure the expanding population has not just enough food available to eat but also access to high quality, nutritious food. The food supply can be secure only when that food supply is sustainable. As per the EAT-Lancet Commission on healthy diets from sustainable food systems report (*Sustainability, 2019*), there are two key areas that apply to all people and the planet. They are described below.

3.1 Healthy Diets

Different foods have differing impacts on human health as well as on the environment. A transition towards a “planetary health diet” can potentially nurture the planet and people both, thereby linking food, health, environment and sustainability. Given by the EAT-Lancet Commission (*Willett et al., 2019, p. 491*), the ‘planetary health diet’ is not a specific diet but rather it is a flexible dietary pattern with consumption ranges for each food group. It largely consists of vegetables, fruits, whole grains, legumes, nuts and unsaturated oils, low to moderate

amount of poultry and seafood and low or no quantity of red meat, added sugar, refined grains, processed meats and starchy vegetables. As per extensive research on dietary patterns, foods and health outcomes, global adoption of this eating pattern would provide major health benefits and also reduce total mortality.

These diets which are largely plant-based and low in red meat and sugar are arguably the best way to feed the global population for optimum health as well as slowed environmental degradation. The planetary health diet is not restrictive in nature, since these are based on scientific guidelines and can be modified depending on variety, flavour, enjoyment and preferences. There should be policies such as improving the affordability of healthy foods, restricting advertising on unhealthy foods, higher taxes on processed foods, improving consumer education that encourages people to choose healthier diets, as the commission suggests.

3.2 Sustainable Food Production

The EAT-Lancet Commission identified a set of boundaries that global food production should stay within to “decrease the risk of irreversible and potentially catastrophic shifts in the Earth system.” (*Willett et al., 2019, p. 491*) since the current food production is causing climate change, biodiversity loss, pollution, and unsustainable changes in water and land use. These boundaries are associated with six key earth system processes: **climate change** that is based on greenhouse gas emissions; change in **land system change** based on cropland use, use of **fresh water**, **biodiversity loss** that is based on extinction rate, and **nitrogen** and **phosphorus cycling** that is based on the application of these fertilizers. Dietary changes alone will not make the food systems sustainable; it must also be combined with improved food production and reduced food waste. The changes should include refocusing agriculture to produce varied nutrients which are rich crops and increasing governance of land and ocean use. Safeguarding biodiversity, producing zero carbon dioxide emissions, and causing no further increase in emissions of two other greenhouse gases: methane which is produced in the digestion of cows and other livestock and nitrous oxide which is emitted from agricultural soils, should also be carefully included in the sustainable food production approach. The commission is asking for a shift in focus to complex systems. The government at all levels, as well as communities have a part to play in redefining how we eat. Nature holds the key to human and planetary health survival.

4.0 Suggested Strategies to Transition towards a Suitable Food System

Transitioning to a sustainable food system that can deliver healthy diets for a universal healthy population is a radical and extraordinary challenge. However, the EAT-Lancet Commission states that “data are both sufficient and strong enough to warrant immediate action, and delay will increase the likelihood of serious, even disastrous, consequences.” (*Sustainability, 2019*)

As per the report’s analysis, this transition would be doable through a combination of reductions in food losses and waste, dietary shifts toward mostly plant-based dietary patterns and major improvements in food production practices (*Willett et al., 2019, p. 491*). These transitions will require widespread action guided by scientific targets starting at national, regional, city and local at multiple levels.

1. ***Nationwide and worldwide commitment to shift toward healthy diets***

Transition to a planetary healthy diet will require the global consumption of foods such as red meat and sugar to decrease by half, while consumption of fruits, nuts, vegetables, and legumes must double. Policies are needed for disincentivizing the consumption of unhealthy and unsustainable foods while improving the availability, access, and affordability of healthy foods.

2. ***Reorient agricultural priorities to focus on producing healthy food instead of producing high quantities of food***

The emphasis in food and agricultural policy should shift from high volumes of a few crops to a greater diversity of nutrient-rich crops.

3. ***Increase high-quality output by sustainably intensifying food production***

Technology and system innovation should be used to farm existing land with fewer inputs in order to gain better yields, reduce carbon and conserve existing biodiversity and ecosystem.

4. ***Coordinated strong governance of land and oceans***

Collectively act to protect natural ecosystems and biodiversity, at local and global levels, to halt the expansion of agricultural land and harvested marine areas.

5. ***Reduce food losses and waste by half***

Reduce the food loss and waste in food production and consumption phases by 50% using a mix of public policies, technological solutions and consumer campaigns.

5.0 Indian Context

India can neither be characterized as only a low-income and undernourished country nor a high-income country and only concerned with obesity, for it is blighted blatantly by both, induced by a food system that fails to provide all the people with healthy, affordable, safe and sustainable diets. Rapid urbanisation, ever-increasing population, food loss and environmental degradation merely add to the heaping woes. The panacea for all these lies in transitioning to sustainable food systems.

Through this section of the paper, the challenges to sustainable food systems from a human health perspective is looked at in detail with suggested strategies to achieve the same in the Indian Context.

5.1 Introduction and Statistics

Attempts to eradicate hunger in India date back to as long as the subcontinent's existence. Despite the many schemes, policies and systems in place since the last seven decades, India is far from achieving Zero Hunger, rather the triple burden of malnutrition is looming large- the consequences of which are huge. Unfortunately, India is now not just a hungry nation but worse, also a nation laden with full, yet undernourished bellies.

The biggest silent killer in the country is a lack of nutrition, which also records food grain surplus. India wastes as much food as the United Kingdom consumes (*Mandla, 2019*), whereas there is a large section of our society struggling for one square meal a day. The Reserve Bank of India (RBI), in its annual report August 2020, stated that India has now reached a stage in which surplus food grain management has become a major challenge (*P. Sharma, 2020*). On the other hand, India is also challenged by 14% of its population devoid of basic sustenance, 17% of its population consuming too much sustenance and an unnerving 80% of its population suffering from hidden hunger (*FAO, IFAD, UNICEF, WFP and WHO, 2020*).

While the Right to Food is a Fundamental Right under Article 21 of the Indian Constitution, the National Health Survey 2017 reported that approximately 19 crore people go to sleep on an empty stomach in the country (*Mandla, 2019*). Furthermore, a recent survey reported that an estimated 7,000 persons, including children, die of hunger every day, putting the annual figure to an estimated 25 lakh deaths because of hunger (*Mandla, 2019*). Be that as it may, the prevalence of overweight and obesity is increasing faster than the world average and so are its

associated diseases. 1 in every 6 people, or 77 million total (Kannan, 2019) are diabetic-making India the diabetes capital of the world. About 80% of the adolescent population is suffering from some form of hidden-hunger (N. C. Sharma, 2019) and thus, malnutrition or bad nutrition is a distressing public health problem in India.

The statistics pertaining to the alarming number of persons suffering from hunger and starvation, hidden-hunger, overweight and obesity, and the deaths resulting thereof are overwhelming and disheartening, however, they unveil the parallel crises plaguing our nation. Malnutrition as in bad nutrition continues to be the largest underlying epidemic in Indian society, even though there is no absolute calorie scarcity on account of surplus production. However, the problem is not limited to the underdeveloped areas and gets more complicated in developed areas which evidently have enough food on the table and money to procure healthy food.

5.2 Factors responsible for Malnutrition and the broken Food System in India

5.2.1 Religion, Culture and Caste

The primary dietary preference of an Indian- i.e. to be a vegetarian or non-vegetarian-, is determined by their religion, culture or caste, irrespective of body type, nutritional needs and nature of work. India reportedly is home to more vegetarians than the rest of the world combined (P. Sharma, 2020).

While vegetarian food doesn't lack nutrition, but the way it is being consumed is where the demerit lies. Culturally, Indians produce and consume surplus grains, but not enough pulses, which are the primary sources of protein for vegetarian consumers. Hence, cereal grains such as rice (predominantly in southern India) and wheat (predominantly in northern India) preparations comprise over 60 per cent per capita calorie intake (P. Sharma, 2020). This permeates the culture, and thus the commercial and domestic culinary experiences have excess choices with carbs and fats, not enough protein. Proteins rich crops thus are neither consumed nor grown in abundance, highlighting the main flaw in the diet as well as the food system.

Also, the idea of being a modern-day vegetarian in India is not eating a rainbow food basket with fruits, greens, nuts and whole foods, rather it is invaded with fried foods, refined carbs and sugar which are calorie dense and nutrient deficient. As the purchasing power of the middle class in India rises, the extra expenditure is seldom made on improving the quality of

their diets as one would assume, on the contrary, it is spent on feasting at fast-food joints that are part of popular culture, and are loaded with high fat, sugar and rarely have any nutrition.

As far as the non-vegetarians are concerned, their daily meals look no different than the vegetarians and lack consistent involvement of poultry, fish, chicken, eggs or meat-based proteins as cultural, social and religious norms hinder their regular consumption. Another nuance to note is that it is a taboo in the Indian culture to consume meat and poultry, while one can consume sugar all day long and be religiously compliant. Hence, the families and religions obviously continue to follow and add to the existing unbalanced food choices with high carbohydrates over protein, though the physical nature of lifestyle declines leading to overweight and obese individuals who are often also micronutrient deficient. As a result of low demand for diverse and nutritional food for consumption, their production and supply is also meagre in the Indian food system.

5.2.2 Policy and Governance

The public policy framework of a country has a huge impact on the food choices of its citizens. In India, the national food security approach has been able to defeat and prevent famines since inception, which aims to provide gross calorie availability via the National Food Security Act (NFSA) or state-level Public Distribution Schemes (PDS) thereby guaranteeing the supply of cheap grains (*P. Sharma, 2020*).

The government ensures that agriculture is paid for and prices are stable by providing a subsidy in the form of a Minimum Support Price (MSP) to farmers and works with the states to centrally procure yields of rice and wheat. The free grains make their way to the plates through the countrywide PDS network of 'fair price shops' (*P. Sharma, 2020*).

Over the years, this approach of aid to consumers and farmers has evolved into a mechanism with a huge political economy and an intertwined supply chain with strong lobbies, political influence and financial gains leading to a status quo that limits the motivation to grow, procure and distribute anything other than cereal grains, mainly rice and wheat. Despite helping counter the problem of absolute hunger, this stable and subsidised policy restricts the food choices and does not provide the required nutrients and micronutrients.

Programmes aimed at the nourishment of the underprivileged, such as mid-day meals in schools or rice to households at Re 1 per kg (*P. Sharma, 2020*), have consequently become a mere channel to drain the bulk procured and the excess produced carb-rich grains. The millets which are far more nutritious and inexpensive like Jowar, Bajra, Ragi are clearly the best buy in terms of calories per rupee but only about two-thirds of the total expenditure is on these grains, whereas 30 per cent is on rice or wheat which is more than three times as expensive per calorie (*P. Sharma, 2020*). The government hence merely focuses on providing food for all, not nutritious food for all thereby causing mass hidden hunger. Food Security as a policy is redundant globally and superseded by Food and Nutrition Security which India needs to adopt urgently.

Also, often the onus of maintaining health and preventing diet-related diseases has been solely placed on the individuals in the population, though food policy experts advise against this strategy. It must be the government's responsibility to disrupt all the forms of malnutrition through effective agriculture and food policy that support healthy diets through a sustainable food system.

5.2.3 Purchasing Power

Many research and intervention studies in India have established that eating does not get better with income. An average Indian poor family spends seven per cent to ten per cent of the food expenditure on sugar, which is more expensive as a source of calories and adds no nutritional value (*P. Sharma, 2020*). Also, for one per cent rise in food expenditure, the increase in consumption of tastier or sugary inputs is nearly half of it (*P. Sharma, 2020*).

India is a massive domestic economy with a retail shop in every alley with addictive offerings ranging from tobacco, candies and beverages for an average consumer to spend the money. There is always something tempting and cheap around to satiate hunger therefore people have taken to eating for the stomach and not the body. Conceptually, one might think of this as a lack of self-control and problem of bad choices, but human behaviour can be sceptical of the long-term and continues to focus on living in the moment, as delightfully as possible with enjoyable and cheap calories.

Even when people have enough money to spare for food expenditure, no positive trend is shown in the expenditure on nutritional items, across all five sections of income tiers. Instead, people are inclined towards buying expensive food indulging in calories, like modern confectionery or fats.

Studies make it evident that in both rural and urban areas the only nutrient that has seen an increase in consumption consistently over the past 25 years is 'Fat', with the increase in per capita income levels (*P. Sharma, 2020*). As a result of which a large number of people are being diagnosed with obesity and diet-related noncommunicable diseases (NCDs) such as hypertension, cancer, and diabetes caused by lifestyle factors.

Economic incentives for the vendors and consumers have made convenience packed foods, sugary, deep-fried or processed options pervasive while lack of economic incentives for farmers have made nuts, fruits and vegetables rare thus engendering the food insecure communities and also affecting their health status critically.

5.3 Economic Impact

The economic impact of the triple burden of malnutrition and failing food systems is also manifold. According to a 2017 report in the CSR journal, about 40% of the food produced in India is bound to be wasted. About 21 million tonnes of the entire wheat produced in India is wasted (*Mandla, 2019*). The warehouses of Food Corporation of India (FCI) operate at near full capacity and the farmers discard excess produce on the streets annually (*P. Sharma, 2020*).

A whopping Rs 50,000 crore worth of food produced is wasted every year in India (*Mandla, 2019*), as per the Ministry of Agriculture & Farmers' Welfare. Apart from the loss due to wastage, the ramifications of hunger crises are socio-economic in nature and resultantly India further loses nearly 4% in Gross Domestic Product owing to malnutrition (*Mandla, 2019*).

India is projected to have 134 million people with diabetes by 2025 that is a 20 per cent total impact globally. Field studies validate that for a low-income Indian family, with an adult with diabetes, as much as 25 per cent of family income may be devoted to diabetes care. Similarly, there are around 60 million people with heart diseases, responsible for one in four deaths with a total cost entitlement of \$2.17 trillion estimated from 2012 to 2030. (*P. Sharma, 2020*)

5.4 Global Comparison

Globally, there were 673 million undernourished people, of which nearly 190 million were in India in 2017-19 (*P. Sharma, 2020*), as per the combined report of UNICEF and WHO. India also has more people with Type-2 Diabetes Mellitus than any other nation in the world (*Malik & ET HealthWorld, 2016*). The Food and Agriculture Report (FAO) 2019 states that India houses approximately 30% of the world's hungry (*P. Sharma, 2020*). This ranks India at 102 out of 117 qualifying countries (*P. Sharma, 2020*) in the Global Hunger Index Report 2019 owing to serious nutrition concerns. Even though the nation remains hungry, the government claims to be a net surplus food exporting nation with record grain production in the past decades.

5.5 Future Implications

The Lancet human capital study on the measure of anaemic, underweight or obese workforce ranks India 158 out of 195 countries which is staggeringly low from a productivity standpoint. The young demographic dividend (65 per cent under age 35) is referred to with children under the age of five constituting 10 per cent of the population. Every second child in India suffers from at least one form of nutrition failure, as highlighted by the National Family Health Survey, NFHS 2016. (*P. Sharma, 2020*)

In 2019, India accounted for 28 per cent that is 40.3 million, of the world's stunted children (low height-for-age) and 43 per cent that is 20.1 million, of the world's wasted children (low weight-for-height) (*P. Sharma, 2020*). With no revolutionary food system changes in the near future, these stark statistics imply the nation is continuously breeding a potentially weak and less competent generation which will have impacted cognitive and physical abilities needed to be the workforce of the future.

5.6 Effective Strategies

Some ways that have proven to be effective over the past century across countries and can be helpful if implied in India are:

1. ***Sugar Tax Policy***

Strategic tax policy on sugary product categories on carbonated beverages, but not limited to, is a time-proven economic tool which drives consumption slower. Going a step further, a nutritional transition can be fostered by giving favourable tax benefits on

nutritional products. This will promote manufacturers to incur the high material cost of richer ingredients and consequently nudge customers to purchase them at a similar price point rather than having to spend a premium for nutrition.

2. ***Promote Poultry***

There exists a dire need to build a culture to embrace poultry products and get past the barriers of sanctimonious attitudes. This will require an investment of political and social capital by the current regime and can prove to be the single largest driver to boost protein consumption and curb the perils of protein-energy malnutrition in the country. Both the food producer as well as the food consumer will benefit from the promotion of poultry in diets.

3. ***Diversify Food Basket***

The Parliament recently unblocked the long due agriculture reforms which promote contract farming and scrap the archaic colonial essential commodities act; these seem to be policy steps in the right direction. States level agricultural agencies need to ensure effective implementation of these reforms and assist with appropriate means to cover for the need for fruits, micro-nutrients, pulses.

4. ***Women's Education***

Women are the decision-makers for most Indian households as far as food expenditure and composition is concerned. Women's education has a multiplier effect not only on household food and nutrition security but also on the child's feeding practice and hence the government needs to promote initiatives like free bicycles, free insurance, free education, etc. to ease the economic burden and facilitate the path to better education for women to steer dietary changes in their lives as well as of their progeny and thereby ensure improved nutritional status.

5. ***Public Distribution System***

The concerned authorities should learn from other low-income societies with successful micro-nutrient based interventions to redefine the scope and mechanism of the PDS programmes to extend beyond funnelling free or cheap grains and using the vast local network to generate higher fidelity. The SMS-based digital PDS in the Indian state of Chhattisgarh, show promising results, where the distribution involves pulses and millets in addition to rice and salt (*P. Sharma, 2020*).

6. *Fortification of Essential Foods*

The government can enforce mass fortifications of staple foods or commonly consumed condiments or foods like sugar, oil, rice, turmeric and milk with micronutrients to enrich the nutrients than what they originally provide, as food salt fortification with iodine has proven to prevent and control iodine deficiency disorders in India previously and is also cost-effective.

7. *Remittances to Purchase Fruits and Vegetables*

Remittances can become an important and stable source of income for many households living below poverty to purchase locally grown seasonal fruits and vegetables allowing them to feed themselves nutritiously.

8. *Economic incentives for farmers to grow healthier foods than more quantity of food*

Interventions that facilitate innovation and improved infrastructure to farmers needed to grow healthier foods that have higher nutritional yield can significantly tackle the problem of food waste and lack of diverse nutritious crops.

9. *Urging people to grow their own food or buy more local and seasonal produce*

Growing healthy vegetables themselves for consumption, or sourcing raw food locally and seasonally can help improve the quality of people's diets as well as support the local food systems.

10. *Campaigns to influence and change consumer behaviour*

National campaigns should be launched and run to raise awareness about the health implications of consuming high calorie and low nutrient food and also to steer positive change in consumers' eating habits towards eating balanced diets and preventing wasting of food.

6.0 Conclusion

Author Joel Salatin had said in his book, '*Folks, This Ain't Normal; You Can Farm*' - "This magical, marvellous food on our plate, this sustenance we absorb, has a story to tell. It has a journey. It leaves a footprint. It leaves a legacy. To eat with reckless abandon, without conscience, without knowledge; folks, this ain't normal." and rightly so, everyone must seek answers to where the food they consume comes from, who grows it, how it is grown, how does it reach you, how does it nourish you, what does it leave behind, to be aware of one's food system. Because if the consumers of food do not ask these questions or scrutinize the state of present

food systems, who will?

As a solution, every University should have a campus garden and every household should have a kitchen garden to help people connect with their food, learn how to grow it and know how it nourishes them so that it kindles their mind with the relevance of the food system.

The author concludes that a progressive transition to Sustainable Food Systems can create a positive butterfly effect by eliminating the triple burden of malnutrition, facilitating nutrition security, enhancing the environment and also promoting better health for the population and the planet. Further, future studies could fruitfully explore the linkages between sustainable food systems and human health. Inquisitive research and innovative policies designed and advocated by global leaders and humanitarian organisations can be a clarion call for the rest of the world to follow to make nutrition security a priority.

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