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Impact of the COVID-19 on Food Security and Sustainable Development Goals in India: Evidence from Existing Literature

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ABSTRACT

Prior to the COVID-19 pandemic, India's food security was in a precarious state. The outbreak has further exacerbated the country's food insecurity. In India, the COVID-19 pandemic has a detrimental influence on the food, nutrition, and health security of the poor, pregnant women, children, disadvantaged members of society, small and marginal farmers, daily wage earners, salespeople, and informal labourers. This study assesses the performance of India's food security before and after the COVID-19 pandemic based on secondary data. This study further examines the impact of the COVID-19 pandemic on food security and SDGs in India based on existing studies. This study reveals that poverty, income inequality, hunger, child malnutrition, unemployment, health insecurity, women's insecurity, gender disparity, and social inequality have increased in India due to the COVID-19 pandemic. For the aforementioned reasons, India will face some challenges

in increasing production activities across the board. Furthermore, the food security and income of vulnerable sections of society would be in peril. This study posits that due to the COVID-19 pandemic, it would be difficult for India to achieve the Sustainable Development Goals of no poverty (SDG1), zero hunger (SDG2), good health and wellbeing (SDG3), quality education (SDG4), gender equality (SDG5), clean water and sanitation (SDG6), decent work and economic growth (SDG8), industry, innovation, and infrastructure (SDG9), reduced inequality (SDG10), sustainable cities and communities (SDG11), and responsible consumption and production (SDG12). This study proposed some policy suggestions to help increase food security and achieve Sustainable Development Goals (SDGs) in India in the near future.

Keywords: Food security; hunger, COVID-19 pandemic; developing economies; Sustainable development goals; India.

INTRODUCTION

Globally, the COVID-19 pandemic has increased the susceptibility of poor individuals, children, and women to extensive vulnerability to food and nutritional security (treimikien et al., 2021). On December 31, 2019, the Chinese government alerted the World Health Organization (WHO) about an epidemic of severe pneumonia in Wuhan, Hubei province, a metropolis with an estimated population of 11 million. On January 2, 2020, 66 percent of the first 41 people hospitalized with the virus had direct contact with the Huanan Wholesale Seafood Market (“Huanan market”) (Dev & Sengupta, 2020; Sukhwani et al., 2020). On March 11, 2020, the World Health Organization (WHO) proclaimed the COVID-19 virus a worldwide pandemic (Hoossain, 2020; Aday & Aday, 2020). Afterwards, it swiftly expanded throughout the nations of the world.

The COVID-19 pandemic triggered both health and economic effects (Dev & Sengupta, 2020). As a result of the COVID-19 pandemic in industrialised and developing countries, the socioeconomic activities of the majority of people, as well as the health of humanity and many medical institutions collapsed. Due to poor infrastructure, inadequate health and medical facilities, lack of social and job security, high dependency of people on the agricultural sector, low technological ability, low living standards, and low coping strategies, the pandemic have also increased the economic vulnerability of developing countries. In developing countries, almost every sector—tourism, financial markets, small-scale businesses, MSMEs, oil, agriculture, dairy and milk production, dairy business, and service sectors—were badly impacted by the global COVID-19 epidemic (Chaudhary et al., 2020; treimikien et al., 2021). Consequently, the food and nutritional security, economic capabilities, and social security of the vulnerable people in developing countries have further declined (Sinha, 2020; HLPE, 2020).

The COVID-19 pandemic has also spawned a number of other issues, including natural disasters, variations in the price of food grains, and significant strain on the health system. Before the onset of the COVID-19 pandemic, many developing countries faced a variety of problems, including malnutrition, obesity, poverty, income inequality, low productivity of food-grain crops, low economic capacity of the population, low employment opportunities, high unemployment, stagnant rural wages, inadequate infrastructure, ineffective government policies, climate change, and natural disasters. (Singh et al., 2019; Sukhwani et al., 2020; Sinha, 2020; Singh, 2020; Mishra & Rampal, 2020). However, the COVID-19 pandemic has further compounded this problems.

According to UN and FAO studies, the COVID 19 pandemic has caused a 10% rise in food costs, which has exacerbated the poverty of 100 million people in developing nations by 2020 (Kansiime et al., 2021). The impact of COVID-19 appeared to be the destruction of the food system chain, a rise in food prices due to an imbalance in the supply and demand of food-grain products, a decline in consumption pattern, a decline in employment and loss of employment in the informal sector, transport restrictions, and an increase in the vulnerability of consumers in developing nations (HLPE, 2020; Sukhwani et al., 2020; Sinha, 2020; Workie et al., 2020; Suri, 2021).

At the global level, around 2 billion people are facing moderate food insecurity and 700 million people are facing severe food insecurity (Pirasteh et al., 2021). Therefore, as food demand is significantly associated with the income of the people, the consumption patterns of poor people are adversely affected in developing economies (Workie et al., 2020). Before the COVID-19 epidemic, 100 million people worldwide were hungry and malnourished (Suri, 2021). Furthermore, around 690 million (8.9%) and 750 million people in the world were undernourished and food insecure in 2019 (Suri, 2021). Food is also a fundamental human necessity, there is no way to exist without it. Thus, food security is essential for sustainable development (Workie et al., 2020). In 199 nations, hunger and malnutrition among children have grown by 1.6 billion, and 83 to 132 million people may suffer from acute hunger in the future owing to the COVID-19 pandemic. Due to the COVID-19 epidemic, it is also estimated that the number of undernourished people on the planet will approach 840 million by 2030 (Suri, 2021). Due to the COVID-19 pandemic, it will be difficult for many countries of the world to attain the United Nations Sustainable Development Goals (SDGs) by 2030. (Psillakis, 2021; Shulla et al., 2021; Pirasteh et al., 2021).

In India, the food, nutrition, and livelihood security of the largest population depend upon the agricultural sector, which is highly climate sensitive. The Indian agricultural sector faces several problems due to climate change and natural disasters every year (Maggo, 2020). For instance, India has lost 18 million hectares of cropped area and 40% of food production due to floods during 2017–2019 (Preethan & Ginoya, 2021). Furthermore, around 90% of the working population is engaged in unorganised sectors in which they do not have any security (i.e., social, safety, and jobs), and 80% of the working people earn less than INR15,000 a month (Summerton, 2020; Sinha, 2020; Pirasteh et al., 2021). India has around 120 million smallholder farmers who contribute around 40% of the nation's food-grain production. Furthermore, around 50% of the Indian population depends upon agriculture and the allied sector for their livelihood security (Maggo, 2020). There was high food insecurity, nutritional insecurity, high-income inequality, extreme poverty, high employment rate, low per capita income, the low economic capacity of people, high inflation, and high disparities in socio-economic development in India before the COVID-19 pandemic (Singh & Sharma, 2018; Mishra & Rampal, 2020; Suri, 2021). India has around 195 million undernourished people, a quarter of the hungry people in the world (Sukhwani et al., 2020).

In India, around 194 million people do not have a secure source of food, nutrition or livelihood security (Preethan & Ginoya, 2021). There is significant variation in the socio-economic structure, demographic profile, availability of houses and sanitation, and epidemiologic and health facilities across Indian states (Acharya & Porwal, 2020). Subsequently, most states such as Uttar Pradesh, Bihar, Madhya Pradesh, and Odisha could not develop an appropriate path for socio-economic development due to the

existence of high food insecurity, nutritional insecurity, income inequality, extreme poverty, high illiteracy, low infrastructure, low productivity of food-grain and cash crops, social riots and conflicts, political instability, and low industrialization (Kumar et al., 2017; Acharya & Porwal, 2020). Therefore, the COVID-19 pandemic has created additional risk for the agricultural sector, which was under threat before it (Maggo, 2020).

In India, production in the agricultural, service, and industrial sectors was adversely affected due to the COVID-19 pandemic at a broader level (Chaudhary et al., 2020). India is a highly agriculturally intensive country, which ensures the food and nutritional security of everyone and the job security of agricultural workers and the farming community. Hence, the COVID-19 pandemic directly hit the food, nutrition, and health security of a marginally weaker section of society, especially children, pregnant women, and agricultural workers (Nguyen et al., 2021). The food system plays a key role in increasing food availability and stability (Mina & Kumar, 2020). It includes the farmers, traders, retailers, and consumers who were negatively impacted due to the COVID-19 pandemic in India (Sukhwani et al., 2020). The COVID-19 pandemic harms the economic activity of migrant labour, small businesses, daily wage workers, farmers, and street vendors in the informal sector in India (Mishra & Rampal, 2020; Singh et al., 2020; Pirasteh et al., 2021). Subsequently, food insecurity, nutritional insecurity, poverty, income inequality, health insecurity, malnutrition, and hunger have increased due to the COVID-19 pandemic in India. These are crucial components of most targets of the sustainable development goals (SDGs) of the United Nations. Thus, there would be a serious concern for India to achieve the SDGs by 2030 (Pirasteh et al., 2021). Therefore, this study is an important contribution to the existing literature which examines the impact of the COVID-19 pandemic on food security and SDGs based on previous studies in India. This study addressed the answers to the following research questions:

1. What was the position of food security before the COVID-19 pandemic in India?
2. Which components of food security are highly impacted due to the COVID-19 pandemic in India?
3. Which goals of the SDGs were negatively affected due to the COVID-19 pandemic in India?

Based on the aforementioned research questions, this study could achieve the following objectives:

1. To provide the performance of India's food security before and after the COVID-19 pandemic based on secondary data.
2. To examine the impact of the COVID-19 pandemic on food security and SDGs in India based on existing studies.
3. To provide policy suggestions to increase food security and achieve SDGs in India.

FOOD SECURITY AND ITS ASSOCIATES

Food is an essential requirement of the human body, and without it, no one can survive. Food security may not be defined by a single indicator due to its multi-interaction association with agricultural production systems, socio-economic activities, climatic conditions, geographical location, political activities, cultural preferences, and government policies (Singh & Sharma, 2018). As per the Food and Agriculture Organization, food security is defined as "All people, at all times, having physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and

food preferences for an active and healthy life” (Muenstermann 2017, p. 40). Food security has four components, i.e., availability, access, utilization, and stability (Singh & Sharma, 2018). Food security is also associated with a situation in which all people in a society have the economic capacity and physical resources to acquire food as per their need to maintain an active and healthy life. Thus, it is also associated with food availability, food accessibility, food quality, and cultural preferences (Sukhwani et al., 2020). The Economist Intelligence Unit published a report on the Global Food Security Index (*GFSI*) to examine the relative performance of food security across economies. This organisation integrates four components of food security, i.e., affordability, availability, quality and safety, and natural resources and resilience. HLPE (2020) included six components such as availability, access, utilization, stability, agency, and sustainability of food to define food security during the COVID-19 pandemic.

Food Availability: This aspect of food security is linked to food production and related activities, domestic food grain stocks, and food grains imported from surplus areas (Kumar et al., 2017; HLPE, 2020). Hence, factors associated with food production can be considered to explain the food availability of a region. A summary of food availability-associated variables is given in Table 1.

Food accessibility: This component of food security is linked to the economic capacity and purchasing power of people to buy food-grain products (Kumar et al., 2017; HLPE, 2020). Thus, food accessibility is negatively associated with poverty and income inequality. There are several variables, such as per capita income, income from farming activities, inflation, price of food-grain products, market accessibility, and so on, that have a significant impact on food accessibility, such as per capita income, income from farming activities, inflation, price of food-grain products, market accessibility, and so on. The summary of the most relevant factors which are positively and negatively associated with food accessibility is given in Table 1.

Food Stability This component of food security maintains the equilibrium of food grains and other staple products in the domestic market (Kumar et al., 2017). Therefore, it measures the equality in demand and supply-side components of food-grain products in a nation. The list of factors which have a positive impact on food stability is given in Table 1.

Table 1: Indicators of food security and its Associates

Components	Indicators
Food Availability	Percentage of arable land, agriculture labour, availability of food in market, milk production, caloric availability of food-grain, current stock of food, farm income, food-grain production, government expenditure on agriculture & on rural development, in-house availability of food, livestock population, per capita calorie per day, per capita consumption expenditure, per capita depth of food-deficit, per capita dietary energy supply, per capita electric power consumption, per capita energy use, per capita food production variability, production of oilseeds, net irrigated area, net sown area, rural connectivity, tractor.

Food accessibility	Consumer price index, credit deposit ratio, cropping intensity, dependency ratio, depth of the food deficit, employment rate, literacy rate, fertilizer consumption, food-price inflation, infant mortality rate, institutional support, length of road, literate population per hectare land, per capita arable land, per capita GDP, per capita income, percentage of families below poverty line, percentage of female population, percentage of main workers, physical accessibility of food, poor people on per hectare land, population growth, urbanization, prevalence of severe food insecurity, prevalence of undernourishment, gross irrigated area, ratio of scheduled castes and scheduled tribe to total population.
Food Stability	Gross irrigated area, accessibility of information, bank credit disbursed to agricultural sector, cereal yield, cropping intensity, employment in agriculture, fertilizer consumption, food prices, food supply, food-grain area, forest area, income inequality, livestock production, number of fair price shop, per capita food production variability, per capita food supply variability, per capita land under cereal crops, per capita land under cereal production, population growth, ratio shop, storage capacity, urbanization.
Food Utilization	Drinking water, primary health care and primary school enrolment, nutritional adequacy of food, local preference of food, food quality, children under 5 years of age affected by wasting, children under 5 years of age who are stunted, children under 5 years of age who are overweight, infant mortality rate, incidence of anemia among women (15-49 years), incidence of exclusive breastfeeding among infants 0-5 months of age, minimum dietary energy requirement, average dietary energy requirement.

Source: Rukhsana (2011); Shakeel et al. (2012); Sajjad et al. (2014); Kumar et al. (2017); Singh & Sharma (2018); Singh & Singh (2019); Sukhwani et al. (2020); FAO - Food Security Indicators (2021).

Food Utilization: It is associated with nutritional content in the food and maintains the nutritional security of the people. Nutritional security depends upon several factors such as physical variables, climatic condition, soil quality, human factors, science & technology and human intervention, etc. The factors associated variables with food utilization is given in Table 1.

OVERVIEW OF SUSTAINABLE DEVELOPMENT GOALS (SDGS)

Sustainable development is defined as a situation which meets the requirements of present and future generations while maintaining environmental sustainability (Singh et al., 2020; Singh et al., 2021). Sustainable development can be achieved through economic development, social development, environmental development, and technological development (Singh et al., 2019; Singh et al., 2021). Therefore, the General Assembly of the United Nations adopted the 2030 agenda for sustainable development in 2015 (Shulla et al., 2021). The Sustainable Development Goals (SDGs) have 17 different goals which are expected to be achieved by global economies by 2030 (Psillakis, 2021). These 17 goals have five pillars, i.e., people, prosperity, planet, peace and partnership, to increase human

well-being and prosperity worldwide (Srivastava et al., 2020). The objectives of each goal of the SDGs are given in Table 2.

Table 2: Objectives of each goal of SDGs

Goals	Main Objectives
Goal 1: No Poverty	To provide employment with minimum wages and social benefits. To provide social protection to the poor and vulnerable section of the society.
Goal 2: Zero Hunger	To achieve food security and zero hunger through sustainable agricultural development and to increase the income of farmers and fishers. To reduce the negative impact of different diseases on human body through strengthen the medical facilities.
Goal 3: Good Health and Well-being	To reduce global mortality ratio. To prevent death of newborns and children under 5 years. To reduce premature mortality from non-communicable diseases.
Goal 4: Quality Education	To provide the better education facility to the girls and boys to increase their skills and knowledge. To create entrepreneurial capability among the youth.
Goal 5: Gender Equality	To reduce gender discrimination through providing equal opportunities to girls and boys. To give equal rights and ownership to the women, and control over land and other forms of property, financial services, inheritance and natural resources.
Goal 6: Clean Water and Sanitation	To provide the equitable access to safe source of drinking water to increase livelihood security. To meets the water requirement for irrigation, industries, and energy and electricity production. To provide adequate sanitation, hygiene facility, and reduce environmental pollution with environmental sustainability and ecosystem services.
Goal 7: Affordable and Clean Energy	To increase sustainable share of renewable energy. To enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology. To promote investment in energy infrastructure and clean energy technology
Goal 8: Decent Work and Economic Growth	To create better ecosystem at working place, and provide appropriate remuneration for service of people and conducive working space. To provide the job security to working population and increase inclusive economic growth.
Goal 9: Industry, Innovation and Infrastructure	To use science & technology to increase industrial growth as maintaining the sustainability in ecosystem services. To develop quality and resilient infrastructure to increase economic development and human well-being. To promote sustainable industrialization through innovation and technological capabilities. To promote technology development, research and innovation, ICT, and industrial diversification.

Goal 10: Reduced Inequality	To promote the social, economic and political inclusion without any discrimination in age, sex, disability, race, ethnicity, origin and religion. To adopt fiscal, wage and social protection to achieve gender equality.
Goal 11: Sustainable cities and communities	To ensure accessibility for all to adequate, safe and affordable housing, and sustainable transport system. To enhance inclusive and sustainable urbanization with maintaining the environmental impact of cities. To implement policies towards resource efficiency, mitigation and adaptation action to climate change, resilience to disasters.
Goal 12: Responsible Consumption and Production	To implement programmes on sustainable consumption and production. To achieve sustainable management and efficient use of natural resources.
Goal 13: Climate Action	To increase resilience and adaptive capacity to mitigate the negative consequences of climate change and natural disasters. To increase awareness among the public toward climate change mitigation and adaptation.
Goal 14: Life Below Water	To reduce marine pollution and manage protection of marine and coastal ecosystem services. To reduce the impact of ocean acidification.
Goal 15: Life on Land	To promote sustainable management of forestry, and conservation of terrestrial and freshwater ecosystem services. To integrate ecosystem and biodiversity resources.
Goal 16: Peace and Justice Strong Institutions	To reduce violence and related deaths. To promote the rule of law to ensure equal access to justices. To reduce corruption and bribery and develop effective, accountable and transparent institutions.
Goal 17: Partnership to achieve the goal	To strengthen domestic resource mobilization through international support to developing economies. To mobilize additional financial resources for developing countries from multiple sources. To promote the development, transfer, dissemination and diffusion of environmentally sound technologies for developing economies.

Source: <https://www.un.org/development/desa/disabilities/envision2030.html>.

IMPACT OF THE COVID-19 ON FOOD SECURITY IN INDIA

Food Security of India before COVID-19 Pandemic

The Global Food Security Index (*GFSI*) is published by The Economist Intelligence Unit to assess the relative performance of global countries in food security. According to the report, between the year 2016 -2021 India has a deteriorated position in global food security (refer to Table 3). The ranking of India in global food security improved during the 2016–2020 period. However, when compared to 2019, the absolute value of GFSI has decreased in 2020. The Global Hunger Index (*GHI*) also measures the hunger of global countries. *GHI* is an integration of four components, i.e., the under-five mortality rate; the prevalence of wasting in children; the prevalence of stunting in children; and the

proportion of undernourished. As per the *GHI* (2020) report, the world was at a moderate level across countries (Suri, 2021). India's ranking was 102 out of 113 countries in *GHI* in 2019, thus it has the poorest performance in *GHI* in global economies. However, India's *GHI* rating has improved from 102nd in 2019 to 94th in 2020, as child nutrition continues to improve (Preethan & Ginoya, 2021).

Table 3: India's position in *GFSI*, *GHI* and indicators of food security

	Global Food Security Index (GFSI)		Global Hunger Index (GHI)		GDP per capita (constant 2011)	Prevalence of undernourishment (3-year average)	Number of people undernourished (3-year average)	Prevalence of anaemia among women of reproductive age (15-49 years)
	Rank	Value	Rank	Value	US \$	%	Million	(%)
2016	75	49.4	97	28.5	5851.4	14.7	192.3	52.6
2017	74	48.9	100	31.4	6182.9	14.2	187.6	52.8
2018	76	50.1	103	31.3	6518.8	13.8	184.9	52.9
2019	72	58.9	102	30.3	6713.9	14	189.9	53
2020	71	56.2	94	27.2	6118.4	15.3	208.6	
2021	-	-	101		-	-	-	-

Source: Various publication of The Economist Intelligence Unit and International Food Policy Research Institute; and Food Agriculture Organization of United Nations (FAO).

Furthermore, around 53% women has the prevalence of anaemia due to lack of nutritional and food security in India. The per capita gross domestic product has declined in 2020. Subsequently, the prevalence of undernourishment as a percentage of population and in number of people have increased in 2020 after COVID-19 pandemic.

The Impact of the COVID-19 Pandemic on Food Security in India

The pandemic of COVID-19 has had a detrimental influence on food security in emerging countries (treimikien et al., 2021). Specifically, the COVID-19 epidemic significantly affected all aspects of food security in India in several ways (Nguyen et al., 2021). Due to socially alienating standards, abrupt lockdowns, and border closures, food accessibility and availability have become unclear (Sinha, 2020). Due to social distancing standards, both the demand for products and services by individuals and the output of the agriculture sector decreased (Chaudhary et al., 2020). According to Amjath-Babu et al. (2020), The COVID-19 pandemic in India has a substantial impact on all initiatives linked to food security.

Food Availability

When the COVID-19 pandemic was at its peak in phases 1 and 2, which was the harvesting period for Rabi crops such as wheat, sorghum, millet, and maize in India (Summerton, 2020), the harvesting, marketing, and processing of these crops were adversely affected due to the reverse migration of labour and the lack of appropriate marketing in India (Ceballos et al., 2020; Workie et al., 2020; Maggo, 2020). Therefore, the supply chain of food-grain products was adversely affected in India (Aday & Aday,

2020). All mechanisms of the supply of food-grain products declined in the domestic market. Furthermore, Rabi crops could not be harvested due to a lack of agricultural workers, and farmers could not sell their agricultural products in the domestic market due to the lockdown.

Farmers could not prepare the land for winter crops due to a lack of finance and other inputs such as seeds, fertilizer, machines, technology, market accessibility, transportation, pesticides, and agricultural workers (Maggo, 2020). Harvesting operations rely on agricultural labor, equipment, and effective marketing (Ceballos et al., 2020). Farmers were unable to buy seeds, machinery, fertilizer, and other inputs for the growth of new crops in the next crop season (Mina & Kumar, 2020). Furthermore, in an urban area, most people depend on the market to buy food-grain products. Furthermore, during the lockdown period, most poor households lost their jobs and economic capacity in rural and urban India (Alvi & Gupta, 2020; Pirasteh et al., 2021). Subsequently, all activities related to food availability were negatively impacted in rural and urban India.

Food Accessibility

The imbalance in demand and supply of food-grain and vegetable crops caused a decline in the prices of vegetable crops in India. In contrast, the prices of food grain products increased in urban areas due to a shortage of food grain products (Mishra & Rampal, 2020). As the price of foodstuffs increased during the COVID-19 pandemic period, thus, consumer behaviour was also adversely affected (Aday and Aday, 2020). In India, around 400 million workers in the informal sector are under stress due to the loss of their jobs (Chaudhary et al., 2020). Subsequently, the economic accessibility and poverty of informal workers increased due to the loss of jobs (Workie et al., 2020). Furthermore, the cost of harvesting, marketing, transport, and labour increased during the lockdown period (Ceballos et al., 2020; Aday and Aday, 2020). India's smallholder farmers produce over 40% of food-grain production (Ceballos et al., 2020; Maggo, 2020), and 263.1 million agricultural workers and 1 billion domestic consumers have a high dependency on agricultural production (Singh et al., 2020). Consequently, the income and food security of small farmers and common citizens has also declined in India (Ceballos et al., 2021; Nguyen et al., 2021; Kumar et al., 2021).

Smallholder farmers were highly vulnerable due to a lack of resources, credit, and basic healthcare facilities (Maggo, 2020). Moreover, the COVID-19 pandemic has increased the vulnerability of local farmers and poor people who were unable to afford food products. It reduces the economic accessibility of farmers and poor people in India (Harris et al., 2020). Farmers were bound to take a loan from their relatives with a high-interest rate due to a decline in agricultural income (Ceballos et al., 2020). Migrant workers and labour migrated from urban areas to rural areas due to the loss of jobs in the cities. Subsequently, the income of people has declined due to a decline in employment opportunities in the agricultural sector. Also, it was essential to maintain social distance to control the spread of diseases (Sukhwani et al., 2020). Around 380 million Indians are working in the informal sector (Summerton, 2020). Most manufacturing industries in the informal or unorganised sector were closed. This caused a reduction in employment for unskilled workers in this sector (Workie et al., 2020). This group of workers do not have much savings and social security to cope with an unprecedented lock-down (Chaudhary et al., 2020). They were also facing psychological pressure and mental illness due to job losses and health issues such as fever and fatigue (Aday & Aday, 2020; Nguyen et al.,

2021). Accordingly, unskilled and migrant workers could not maintain their daily dietary patterns due to a lack of money or being unable to borrow money from their relatives (Summerton, 2020).

Impact on Food Stability

Indian farmers do not have proper storage facilities for food-grain products due to a lack of infrastructure facilities, and they were unable to sell their products in nearby Mandies during the COVID-19 pandemic. The food supply chain was stopped due to the COVID-19 pandemic (Mina & Kumar, 2020). Furthermore, farmers were bound to sell their food-grain products at at least the minimum price to maintain their additional daily requirements. Also, high-quality fruits, vegetable crop production, and dairy products were damaged due to a lack of storage facilities or farmers could not sell them in the market (Mishra & Rampal, 2020; Štreimikienė et al., 2021). Food products cannot be exported from one region to another due to transport restrictions (Štreimikienė et al., 2021). Subsequently, the income of farmers significantly declined and they could not repay their crop loans and informal debt due to in India (Mina & Kumar, 2020; Ceballos et al., 2020). Also, farmers were unable to borrow money from their relatives to maintain the cropping pattern for the next season. Accordingly, the food stability of components was adversely affected in India.

Impact on Food Utilization

Poor communities meet their nutritional security from staple foods such as wheat, rice, sorghum, and maize due to their low income. They cannot afford non-staple foods such as eggs, meat, and milk because of their low income (Summerton, 2020). Most Indian farmers do not have proper storage facilities; thus, 20% to 30% of food-grain production was damaged due to a lack of storage facilities, which caused a reduction in the quality of food in India. Food utilisation is also adversely affected due to a reduction in healthy diets, shelf-stable food, and a decline in actual nutritional content in the food (HLPE, 2020; Sukhwani et al., 2020).

COVID-19 Pandemic and Sustainable Development Goals (SDGs) in India

The impact of the COVID-19 pandemic on food security, nutritional security, child feeding and nutrition, women's diet, education system, employment, income inequality, health infrastructure, industries and agricultural activities was negatively affected in India (Štreimikienė et al., 2021; Pirasteh et al., 2021). The SDGs are linked with food and nourishment, i.e., SDG1 and SDG2. Food safety and supply security were negatively affected due to the COVID-19 pandemic in India. Most people could not afford food grains as per their needs due to rising food prices. Hence, it increased hunger in India (Pirasteh et al., 2021). Most academic institutions could not open during the pandemic. Subsequently, around one out of five students lost learning for a year. Quality education was also adversely affected due to around 66% of the working population losing their jobs or receiving low income in the informal sector in urban India. Furthermore, self-employed and agricultural workers and the farming community in rural areas also lost their jobs and income. Accordingly, decent work and economic growth were also negatively impacted due to the COVID-19 pandemic in India (Srivastava et al., 2020).

Self-employed women and female workers lost their jobs due to the COVID-19 pandemic. It also increased the additional burden on women. For instance, around 67%

of women spend more time taking their children who were unable to go to school in India. Hence, gender inequality and additional pressure on women have increased in India. Subsequently, hunger, poverty, and income inequality have increased in India (Chaudhary et al., 2020). India's rank dropped from 117 in 2019 to 120 in 2020 in the Sustainable Goals Index as per the Sustainable Development Report 2021. Medical facilities and hospitals were also overwhelmed due to the extensive pressure of patients in India. Thus, the COVID-19 pandemic harms SDG3, which focuses on good health and well-being (Pirasteh et al., 2021). Furthermore, India's performance has declined in SDG4 (quality education), SDG 6 (clean water & sanitation), SDG 13 (Climate Action), and SDG 7 (affordable and clean energy) in 2021 due to COVID-19 (Pradhan et al., 2020). For India, it would be difficult to achieve no poverty (SDG1), zero hunger (SDG2), good health and wellbeing (SDG3), quality education (SDG4), gender equality (SDG 5), decent work and economic growth (SDG 8), reduced inequality (SDG10), and sustainable cities and communities (SDG11) in the future (Srivastava et al., 2020; Pirasteh et al., 2021). The impact of the COVID-19 pandemic on SDGs is given in Table 4.

Table 4: Impact of COVID-19 pandemic on various goals of SDGs in India

Goals	Impact of COVID-19
Goal 1: No Poverty	90% workforce of informal sector could not maintain their livelihood security due to lack of jobs, thus it causes to increase poverty in India.
Goal 2: Zero Hunger	Food supply chain was disrupted due to COVID-19, thus hunger increased in India.
Goal 3: Good Health and Well-being	Human health and well-being were adversely affected due to lack of healthcare facilities in India.
Goal 4: Quality Education	Most of academic organizations were not open during pandemic, thus it reduces quality education and foundation of the students in India.
Goal 5: Gender Equality	Livelihood security and healthcare security of women decreased due to loss of jobs.
Goal 6: Clean Water and Sanitation	Water and sanitation facilities were in stress due to extensive labour migration from urban area to rural area in India.
Goal 8: Decent Work and Economic Growth	Reduce employment opportunities for skilled and unskilled workers in informal sector which caused to reduce economic growth by 3.2% and unemployment rate by 26% in India.
Goal 9: Industry, Innovation and Infrastructure	Industrial output and business operation decreased due to decline in investment in infrastructure and most sectors such as crude oil, refinery, fertilizers, cement, natural gas and renewable energy were shrink in India.
Goal 10: Reduced Inequality	Income inequality was increased due to decline in jobs in formal and informal sector in India.
Goal 12: Responsible Consumption and Production	Water demand was increased and demand of fertilizers, steel and other industrial products were declined due to low economic and purchasing power of the people.

Source: Chaudhary et al. (2020); Srivastava et al. (2020); Štreimikienė et al. (2021); Pirasteh et al. (2021).

CRUCIAL SUGGESTION TO INCREASE FOOD SECURITY AND SDGS IN INDIA

There is an urgent need to enhance India's food system in order to increase food security and eliminate hunger. Most farmers are not ready to accept new farm bills that were passed in the Indian parliament last year (2021). This may be caused by a hampered supply chain of food-grain products in the domestic market. Another negative implication of this bill may be that it may cause a reduction in the supply of cash crops to the agri-industry. Subsequently, production activities of agri-industries, the income of farmers, and employment opportunities may decline in the near future. Most farmers and workers in the informal sector in India have very limited economic capacity. Therefore, it is suggested that the government should provide financial support to farmers to help buy agricultural inputs for cultivation and to agricultural workers, daily wage earners, and others to sustain their livelihoods and move out of the loan and poverty trap. There was high unemployment in India, and most sectors of the economy are struggling to maintain their production activities after demonetization and the implementation of the new tax regime, i.e., GST. Thereafter, the COVID-19 pandemic hampers all sectors of the Indian economy. Consequently, most skilled and unskilled labour in the agricultural, industrial, and service sectors have lost their jobs.

In India, unemployment increased from 6.7% to 26% due to the consequences of the COVID-19 pandemic, and around 14 lakh people lost employment (Pirasteh et al., 2021). Hence, it would be a challenge for India to create jobs in all sectors of the economy. Otherwise, it would be difficult to create demand for food-grain and non-food-grain products in the domestic market. India has a high population density with poor health infrastructure (Ceballos et al., 2020). India needs to develop adequate health infrastructure to reduce the negative impact of similar pandemics in the near future (Maggo, 2020). During the lockdown period, the employer could not provide social security to their employees. Thus, it will be a critical challenge for policymakers to maintain the trust of the labour force to return to their jobs in their respective industries. As 90% of the working population is engaged in the informal sector in India, there is a need to provide financial support to this sector to increase the economic capacity of workers in this sector and to increase the economic growth of India. As workers do not have any social security in the informal or unorganised sectors in India, the government should provide social security to the workers in this sector to achieve SDGs by 2030 as producers do not have the trust to increase the supply of goods and services in the domestic market. Hence, it is essential to increase the demand for products in the domestic market to increase the motivation of producers to increase the supply in the market. It would be useful to create jobs for skilled and unskilled labour in India. Crucial suggestions to increase SDGs in India are given in Table 5.

Table 5: Crucial suggestions to increase SDGs in India

Goals	Suggestions
Goal 1: No Poverty	Increase the demand and supply components of food security and agricultural sector.
Goal 2: Zero Hunger	Increase the economic capacity of population in informal sector.

Goal 3: Good Health and Well-being	Develop appropriate health infrastructure and facilitate health security to the rural and urban dwellers.
Goal 4: Quality Education	Increase the academic quality through providing appropriate instruments to the students and trainings to compensate the losses of academic syllabus during lock down period.
Goal 5: Gender Equality	Increase the jobs for women in informal sector.
Goal 6: Clean Water and Sanitation	Reduce labour migration to maintain the ecosystems services and to provide clean water and sanitation.
Goal 8: Decent Work and Economic Growth	Provide social security to the workers in private and unorganized sectors.
Goal 9: Industry, Innovation and Infrastructure	Increase the demand of products in domestic market. Increase the extensive investment in private sector to increase their investment in money and capital market. Meet the labour requirement for industries in informal sector.
Goal 10: Reduced Inequality	Create extensive jobs in informal and unorganized sector.
Goal 12: Responsible Consumption and Production	Increase the demand of products in domestic market through increasing economic capacity and purchasing power of people.

CONCLUSION AND POLICY PROPOSALS

The prime aim of this study was to provide an assessment of the performance of India's food security before and after COVID-19. Furthermore, it examines the impact of the COVID-19 pandemic on food security and SDGs based on previous literature. Finally, it comes up with some policy suggestions to increase food security and achieve SDGs in India. India's position in food security was very poor among the global countries before the COVID-19 pandemic. India's ranking in *GHI* and *GFSI* significantly declined after the COVID-19 pandemic. Per capita income has also declined after COVID-19 in India. All components of food security were negatively impacted due to the COVID-19 pandemic in India. Food availability was adversely affected due to supply chain disturbance, labour shortage, inappropriate harvesting of rabi crops, lack of transport, and loss of food-grain production (Summerton, 2020; Ceballos et al., 2020). Also, farmers could not buy seeds, machines, fertilizer, pesticides, and agricultural inputs for the growing of crops in the next season (Mina & Kumar, 2020; Workie et al., 2020; Pirasteh et al., 2021).

Food accessibility declined due to loss of jobs and income, high food prices, lack of demand in the market, and disturbance of school meal programmes (Alvi & Gupta, 2020; Ceballos et al., 2020; Nguyen et al., 2021). The economic capacity and purchasing power of people declined due to the COVID-19 pandemic in India (Harris et al., 2020; Ceballos et al., 2020; Sukhwani et al., 2020). It also increases the debt trap and poverty of small farmers (Mina & Kumar, 2020; Ceballos et al., 2020). Food stability also declined due to supply chain disturbances, market instability, price volatility, import and export restrictions, and a lack of proper storage facilities for food-grain crops (Mina & Kumar, 2020). Due to their low income, the poor community of society obtains nutritional security from staple foods such as wheat, rice, sorghum, and maize. Hence, food

utilisation was also adversely affected due to a reduction in healthy diets, shelf-stable food, and actual nutritional content in the food (Sukhwani et al., 2020).

India will face four major challenges to ensure food security in the future: to maintain the demand and supply components of food security; to increase the trust of Indian farmers towards the new agricultural or farm bills; to move farmers out of the loan trap; to create extensive jobs for skilled and unskilled labour; and to develop appropriate health infrastructure. Most activities which are essential to increase food security, health and well-being, quality education, gender equality, decent work and economic growth, equality, consumption, and production were adversely affected due to the COVID-19 pandemic. Therefore, it would be difficult to achieve no poverty (SDG1), zero hunger (SDG2), good health and wellbeing (SDG3), quality education (SDG4), gender equality (SDG5), clean water and sanitation (SDG6), decent work and economic growth (SDG8), industry, innovation, and infrastructure (SDG9), reduced inequality (SDG10), sustainable cities and communities (SDG11), and responsible consumption and production (SDG12) in India.

The Indian government needs to increase extensive investment in the agricultural sector to ensure sustainable food production, reduce hunger and food insecurity, and develop resilience to cope with natural calamities in India. Increase government support for food and cash transfers to farmers and vulnerable groups such as migrants, landless labourers, daily wage earners, and pregnant women (Sinha, 2020; Workie et al., 2020). The Indian government also needs to strengthen the public distribution system to ensure that the food security of the vulnerable people in society is guaranteed (Saxena & Mohan, 2021). There is also a need to make further changes in fiscal policy to increase the social welfare of Indian citizens (Sinha, 2020). Adoption of a food system-based policy to cope with this type of pandemic is imminent (Mina and Kumar, 2020). The increase of monetary investment in key sectors—education and social development—is also mandatory in India (Suri, 2021). The reduction of the cost of nutritious food; the implementation of social protection programmes; and the creation of more job opportunities to increase the standard of living of people and ensure the food security of rural and urban dwellers in India are necessary steps by the Indian Government (Suri, 2021). Lastly, the implementation of effective policies for poverty reduction, empowerment of women, and the empowerment of the vulnerable sections of society by the Indian government is also a necessary step toward improving food security (Aday & Aday, 2020).

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