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Global Warming, Food Security and Adaptations: A Case Study of India

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Abstract: ***The severity of India's food security concerns has been exacerbated by global warming. While the link between global warming and food security is multifaceted, most studies concentrate on one aspect of food security: food availability. The influence of global warming on India's food security is examined in this research, which considers three aspects: provision, distribution, and assimilation. It concludes that making sure food security in the face of global warming will be a great obstacle, and suggests a variety of strategies, including the implementation of renewable agricultural practices, a greater focus on urban food protection and national health, the availability of subsistence security, and long - term relief provisions in the case of natural disasters.***

Keywords: Global warming**,** Food security, Agriculture, Malnutrition, Income

1. Introduction

Goals to eradicate hunger, promote food security, and enhance nutrition are the main tributes of the Sustainable Development Goals (SDGs) set by the United Nations (UN). Since India's considerably large rates of economic growth and development have not resulted in a decline in hunger and malnutrition, hence food security remains a top development priority for the country. Between 1990 - 91 and 2019 - 20, per capita gross domestic product (GDP) of India's income expanded at 8% and 6% per year, correspondingly (Albanes Faria and Ruiz Pilar, 2016).

However, the number of individuals suffering from malnutrition has decreased only slightly from 225.1 million in 19950 to 189.6 million in 2020, and India has fallen short of meeting the Millennium Development Goal of decreasing the portion of the population living under hunger. The Global Hunger Index places approximately 12 Indian states in the 'worrisome' classification. In accordance with the Demographic Health Survey (DHS) 2010 - 15, states like Bihar (49.1%), Madhya Pradesh (47.5%), and Andhra Pradesh (37.1.8%) have a relatively high percentage of infants of age five who are underweight (Barua Anamika and others, 2019).

While significant swaths of India's people suffer from severe malnutrition, rising wealth and industrialization are quickly shifting the basic needs such as food away from grains and toward elevated agricultural products like fish and meat. As a consequence, overall demand for agricultural goods is expected to continue rising as a result of rising population and increased indirect need from nutrition. Chen Wei - Yin and others (2017) estimated India's food availability up to 2026. Thus in accordance with her, the rise in overall food consumption is mostly attributable to population rate income growth, while supply is anticipated to be restrained by poor yield increases.

Furthermore, meeting India's long - run food needs solely through domestic production would be problematic. According to Downing E. Thomas (1996), satisfying market expectations for grain production by domestic manufacturing will be challenging given present production tendencies. Stagnant productivity is one of the most serious concerns plaguing Indian agriculture. India's grain productions are lesser than those in industrialized regions of the world such as North America (7, 014 kg per hectare) and the Eurozone (6, 142 kg per hectare) these statistics are well elaborated in table - 1. Furthermore, table - 2 demonstrates that India's cereals and grain output per acre has been stable throughout the 1980s.

Table 1: Food - Grain Productivity by Region (kg per hectare)

Country/ Region	Kg per hectare
East Asia Pacific (developing only)	5,184.0
Central Europe and the Baltics	4,131.1
Sub- Saharam Africa	1,433.5
Europe & Central Asia (all income levels)	3,661.6
Euro area	5,855.4
North America	6,671.0
India	2,961.6
World	3,851.3

(Source: Self - constructed from World Bank Database)

Table - 2: Food - Grain Productivity, growth rates (percentage)

	Rice	Wheat	Coarse cereals	Pulses	Total foodgrains
1980-81 to 1990-91	2.7	3.4	2.6	2.0	3.0
1990-91 to 2000-01	0.9	1.7	1.3	-0.6	1.7
2000-01 to 2010-11	1.6	1.0	4.1	2.4	1.7
2010-11 to 2014-15	1.6	-1.0	3.1	1.9	1.8

(Source: Self - constructed from Reserve Bank of India Database)

2. Interconnected Food System of India

India, with a population of 1.37 billion, is among the highest population densities economies. India is split among 28 states and 8 Federal Territory, covering a total area of 3.3 million sq. km. Each central and state territory has 718 divisions, which are being subdivided between city municipalities and remote areas. Spite of significant urbanization tendencies, the most of Indians reside in remote rural areas, accounting for 65 percent of the population. Furthermore, encompassing make up a substantial section of the urban labour, and 30 million of such migrants are retreated to respective rural locations as a result of the epidemic, putting their economic prospects in jeopardy. Although settlements in cities are a visible manifestation of

continuous destitution, deprivation in rural areas is far more entrenched and widespread (Leary Neil and others, 2008).

India is remains the globe's major supplier of milk, lentils, and ingredients, notwithstanding slowing agricultural development. India does have the most farmed landmass for wheat, grains, and cotton in the world. In addition to this; maize, grain, silk, sugar, tea, fruits and vegetables, and fishery products, India to world output.195 million ha, or 60 percent of accumulated land productivity, are farmed, with 63 percent being monsoon and 37 percent being irrigated. Despite the fact that agriculture's strategic viability has waned well over years, somehow it engages 60 percent of the remote labour force and is the largest source of revenue in remote area of India (Lobell David and Marshall Burke, 2010). Livestock, agricultural productivity, and deprivation are all intertwined in villages of India. Amid agricultural revolution of 1960s, India's agriculture concentrated on developing steeply wheat and rice crop production, as well as expanding synthetic pesticides such as fertilizer and insecticides, which improved production per acre while reducing farmed acreage. Drought circumstances suffered during British control fueled the agriculture revolution in portion, before to gaining its freedom in 1945; the British sold Indian farm commodities to sustain their kingdom and military operations overseas, whereas huge number of Indians suffered from starvation (Pittock Jamie, 2009).

The terrible Bengal Drought of 1943, which killed over 2 million people in Indians, wasn't really caused by a lack of food; Indian farmers generated enough food, however the crops were routed abroad, so what was accessible upon that regional supermarket became too costly for impoverished Bengalis to purchase. India does not have a drought following freedom, because majority of the agricultural restructuring was to reverse British agricultural policy. Land holdings, on the other hand, kept modest; in reality, land holdings in India actually dropped during 1970 and 2020. In India, the majority of farmers remain modest or destitute farmers. Ever since agricultural revolution, farm productivity has grown, with India being conscience in crop yields and generating sufficient grains to satisfy caloric bases need of the India people. Farmers continue to be vital part of India's food production mechanism, which is unsurprising. Customary food retail establishments generally account for about 98 percent of the overall food retail business, with store adoption staying minimal at only 2 percent. Fundamentally, the majority of Indians continue to use customary food methods, purchasing fresh fruit and other goods from conventional marketplaces that purchase from local farmers or via village conglomerates. In reality, village business centres in India seem to be on the increase, connecting smallholder agriculture landowners to fast developing metropolitan markets. The centers assist the procurement of agricultural inputs, infrastructure, and unsecured loans for producers in relation to food purchasing (Sarkar Atanu and others, 2019).

Considering the significance of conventional markets producers in the Indian food supply chain, interruptions in agricultural production and the distribution network would have a detrimental effect on the population's food production and security. Despite the fact that India produces a significant supply of food but is still a major exporter of farm products, malnutrition is widespread, with 4 percent of the population suffering from malnutrition. Malnutrition is much more common in remote India than in metropolitan regions. According to nationwide remote village malnutrition, 14 percent of the indigenous populace is vulnerable to food insecurity. Subsistence minority food supply, as well as climatic disasters, is intrinsically related to local malnutrition. We investigate the determine factors of food malnutrition in India, considering the inter - connectedness of the Indian food industry (Roggema Rob, 2009).

3. Food Insecurity Determinants: Case Study of India

The amount of food crops to satisfy nutritional demands is a major concern in food and nutritional security in India. Despite the fact that India dominates the globe in the development of a range of farmland significant crops, per person gross food grain supply has remained inconsistent and varied between regions. The Indian government established a national distribution model to provide wider and much more equitable availability throughout the regions.

Yield reduction, in addition to functional market constraints to food crop supply, have an impact on food provision in the remote areas of India. Agriculture output reductions are connected to water deficiency in especially. Groundwater in India are expected to drop beneath 50 percent of requirement by 2030 if present water consumption patterns continue, putting India's river systems under intense pressure. Water level is also falling, particularly in India's northwestern provinces, particularly Punjab and Haryana, which generate the majority of the country's rice and wheat. Around 75percent of Indian population relies on agriculture, as well as any potential reductions in grain crops are expected to worsen malnutrition among India's low income population living in remote areas (Venkataraman and others, 2019).

Crop damage limit not just food security and moreover farm earning, aggravating regional food poverty. Crop shortage can have a severe effect on farming community with small landholdings. In the crop cultivation process, farmers bear on a lot of loans, which they seem unable to repay when harvests fail, midsize farmers in India debt a total of 18 billion US$. The high level of un - payable debt results in a large number of farmer to committee suicides. Midsize farmers are highly sensitive to global warming and climate change because they have limited support systems and restricted access to loans (Yadav S. Shyam and others, 2019).

Agriculture productivity is also hampered by a deficiency of infrastructure facilities. In the developing World, inappropriate food infrastructure forms it highly problematic to bring fragile agricultural goods to market on schedule. If agriculture products are not properly kept and handled, they might deteriorate. Because remote regions in the south regions are often lack adequate refrigerated storage and backup infrastructure, elevated commodities must enter markets as soon as feasible to avoid post - harvest wastage. The delivery of food facilities in rural India is a difficult

task. In places which have been electricity, supply problems and disruptions are an issue. Forward food infrastructure improvements and agricultural modernization are hampered by the deficiency of necessary facilities infrastructure, resulting in a loss of regional purchases.

Class prejudice is indeed blamed for different income classes in rural India. Midsize and ignored farmers belong to poor and dispossessed castes, and they lack exposure to a certain socioeconomic and capita institutions as privileged classes have such privileges. Malnutrition is greater in downtrodden caste and households as compared to the upper and privileged caste ones, according to landowners. People from scheduled lower castes have been denied economic opportunity for generations due to socio - cultural and institutionalized prejudice. Caste prejudice persists in remote India, impeding credit facilities, assets, and education.

The body's capacity to retain nutrients is investigated by means of availability to sanitation facility elements, and the ultimate food security design is implemented. Supply of water, hygiene, and care services, according to research, is critical for the body's capacity to properly use the food ingested (Maxwell, S. & Smith, M.1992). Nevertheless, many Indian households do not have availability to safe drinking water. Hygiene and sewage are indicators of better health and the capacity to use all of the minerals eaten. Gastroenteritis is a water - borne illness produced by infection. Polluted water is an excellent illustration of where and how minerals can be depleted even after consumption. Food production is linked to water and power sustainability in rural areas of India.

4. Impact of Global Warming on Food Security

"Food security occurs once all population, at all periods, have physical, geographical, societal, and economic adequacy to appropriate, clean, and nutritious food that fits their nutritional requirements for a healthy life, " (UNICEF and IFAD). Food security has three key characteristics, including this description: food supply, food availability, and food assimilation. As a result, enough food yield isn't enough to ensure a nation's food and nutrition security.

One of the most pressing challenges related with the global warming is food security. Food security is impacted by global warming and climate variations in a variety of ways. Crops, cattle, forests, fisheries, and aquaculture are all affected, and it can have severe social and economic implications such as lower revenues, destroyed livelihoods, market disturbance, and negative health effects. It's vital to remember, however, that the overall effects of global warming are determined not just by the magnitude of the environmental disruption, but also by the fundamental instabilities. The overall effect of global warming on food security is determined by both ecological and societal risks (Jaswal Sultan Singh, 2014).

However, much of the work on the influence of global warming on food security has concentrated on only one aspect of food security and that is food supply. While global warming's Impact on other Imperative aspects of food security such as availability and assimilation, have gotten very little academic interest. Hence this meticulous study investigates the global warming's influence on the food security of India by taking into account all the above mentioned aspects of food security and safety.

4.1 Impact on Food Yield/Supply

Global warming adds to India's long - run food vulnerabilities by affecting crop yields in a variety of ways. For one thing, it might lead to considerable elevations in monsoon rainfall patterns both annually and seasonally. In accordance with the estimates of the World Bank forecasts, an average global warming of 4°C will result in a 10% rise in average monsoon rainfall concentration and 15% uplift in year - to - year variations in monsoon rainfalls, provided by the International Energy Agency's existing regulatory scenario as well as other energy institute models. Droughts will become more common in the northwest region of India, according to a report by the Singh. S. P (2016), whereas humidity will grow in the southern section of the country.

Global warming will have an especially devastating influence on water supply in India, considering major sections of the nation currently face water shortages and rely heavily on groundwater for cultivation. As per Bosello and others (2012), less rainfall, droughts and decreased moisture in India have resulted in the dwindling of wetlands and significant ecological damage. Approximately 54% of India is under severe to serious water shortage. Significant portions of northwest India, particularly Punjab and Haryana, which produce the majority of the nation's rice and wheat, are already under severely water - shortage.

Groundwater depth is dropping throughout India, as seen in figure - 1. Around 54% of India's groundwater sources are shrinking, with 16% of them shrinking by over least 1 meter every year. North - western India shows out as something particularly susceptible; 58% of the 600 groundwater wells surveyed in the region showed dropping of groundwater levels. India's aquifers will become increasingly more vital for agriculture as a result of extended downturns rainfall and dry spells caused by global warming, putting more demand on water supplies.

Food water needs in India will surpass natural water resources, as per World Bank predictions, with a global average temperature of 2°C, over pre - industrial concentrations. Water demand and supply imbalances are plausible to be far consequences for wheat yield and India's food security.

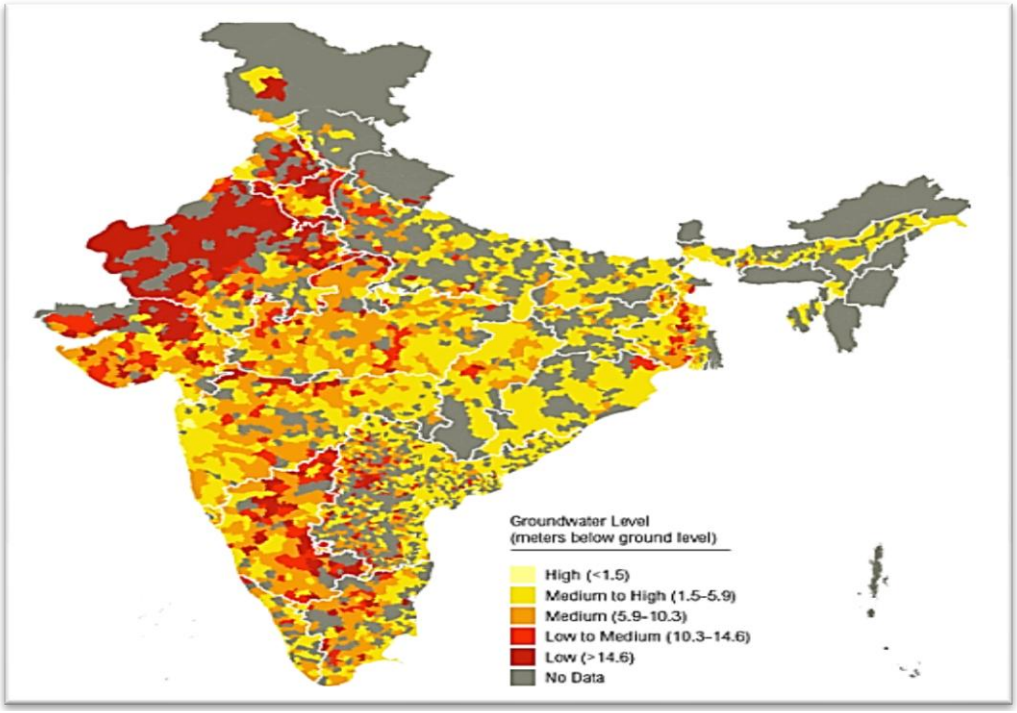

Figure 1: Ground - water level (meters below ground level)
(Source: World Resource Database)

Both Agriculture and food supply in India, is extremely susceptible to global warming and climate variability, owing to the sector's continued sensitivity to rainfall fluctuation. Admittedly, rain - fed agriculture accounts for around 65% of India's planted land. Figure - 2 demonstrates that Indian States such as Rajasthan, Maharashtra, Karnataka, Uttar Pradesh, Gujarat and Madhya Pradesh have the most areas with extremely moderate and high global warming risk.

Wheat and rice, two staple foods in India, have been discovered to be highly vulnerable to global warming. Wheat cultivation in northern India is very susceptible to heat more than 34°C, according to Food and Agriculture Organization (2012). Comparable worries about wheat output were expressed in a 2007 study by the Intergovernmental Panel on Climate Change (IPCC) that a 0.7°C increase in cold season in India is expected to diminish wheat production by 0.56 tonnes/ ha. Rice yield will be harmed considerably more adversely by acute water shortages combined with extremes of temperature.

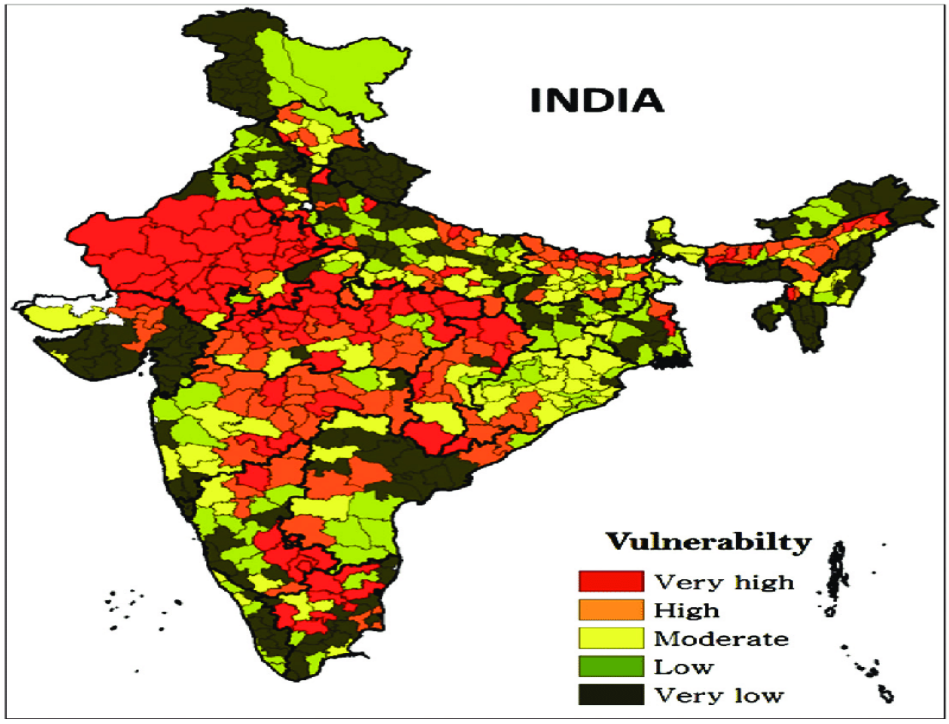

Figure 2: Susceptibility of Agriculture to Global Warming
(Source: World Resource Database)

4.2 Impact on Food Availability

While much work has been made in comprehending agricultural production sensitivity, there are very few models that analyse the effects of global warming and climate change on food availability. As per the IPCC's 4th Assessment, by 2080, 300 to 700 million additional populations throughout the world might be hungry, relying on the global warming forecast (Komba Coretha and Muchapondwa Erwin, 2015). So if the positive benefits of the growth in the economy are considered, Levina Ellina and Tirpk Dennis (2006) anticipate that global warming will have a major impact on future malnutrition. By 2050, extreme malnutrition would have increased by 62% in South Asia and 55% in Sub - Saharan Africa, as per their model predictions.

Similar modeling - based research on the influence of global warming on food availability and nutritional in India seems to be tougher to obtain by. Furthermore, prominent specialists such as Nira Ramachandran have emphasized the significance of including global warming in the country's nutrition debate. Global warming, according to Ramachandran, has the potential to stifle, if not completely eliminate, India's progress in food security and nutrition.

The economic factors of food shortages are amplified by global warming. Changes in the duration of the agricultural planting period and the impact of natural disasters as a result of global warming and climate change, as well as the resulting increase in production, have a negative impact on the farmer's operating earnings. India is especially susceptible since its remote regions are home to tiny and vulnerable farmers that depend on monsoon small cropping for food availability, which only lasts very few months in a typical year. As per Parry Jo - Ellen and others (2005), food stockpiles start to run out 3 - 4 months after production, agricultural employment become scarce, and food scarcity reach starvation levels after the next rainy season/cycle.

Fishermen and individuals who rely on the woods will also suffer as a result of global warming. Landless farm workers who rely only on agricultural incomes are at the greatest danger of becoming hungry. Water shortages will have a greater impact on children in areas where there is a significant level of food shortages and disparity, due to their susceptibility. In a research survey of 9 villages in Maharashtra's water shortages Jalna area, The Committee on approaches to climate change adaptation (2010) discovered that regional crop production and yearly earnings of farmers fell by nearly 60% in the famine of 2012 - 13.

Because impoverished people often spend a great deal of their wages on meals, such a considerable reduction in revenue is able to make a significant effect on child health. Rodriguez - Jaswal Sultan Singh (2014) discovered that flood vulnerability is linked to long - run malnutrition in a research based on fourteen flood affected and eighteen non - flood affected villages in Orissa's district. Children who were vulnerable to floods in their first year of infancy had 33% greater rates of severe malnutrition, as per their research.

However, global warming influence on food availability is not restricted to remote regions. Food insecurity in cities is indeed a serious problem, as poor families from particularly in remote areas frequently relocate to urban localities in search of work. Hunger, according to Ramachandran, frequently causes a surge of rural to urban migration, displacing whole households to slums. Almost all of these migrants enlist the help of low - wage employees in the informal sectors of industrialized cities, because there is little job security and earnings are under the threshold amount. Indices of urban food insecurity in India paint a bleak picture.5In metropolitan Bihar and Karnataka, for example, nearly 30% of infants of a years of age are underweight, detail of under - nutrition status of infants in India is explicated in table - 3. Even in comparatively rich areas like Karnataka and Maharashtra, the rate of underdeveloped and squandered urban children remains significant.

Global warming will worsen India's current urban under - nutrition issues. Minimal people living in informal residences, which are frequently situated in flood - prone locations and even where dwellings is particularly subject to severe weather situations such as storm and water disasters, are anticipated to face the greatest climate uncertainties. Mumbai and Chennai are particularly vulnerable to the effects of global warming. Singh S. P (2016) reflect Kolkata to the category of places that are extremely vulnerable to climatic hazards, claiming that global warming would exacerbate the Hooghly River's seasonal flooding.

The impoverished people of Kolkata are especially susceptible since their residences are in poor regions or swamps that are especially sensitive to flood and tidal currents.

Considering that food is the most expensive item for impoverished urban localities, any relocation, property damages, or destruction to tangible capital caused by an impending storm would have a severe influence on household food availability. The urban deprived population has also been recognized as the category most susceptible to rising food costs as a result of projected climate change - related output shocks and decreases.

Table 3: Nutritional situation of Infants in Remote areas of India (2020 - 21)

	Proportion of children under 5 who are stunted (%)	Proportion of children under 5 who are underweight (%)	Proportion of children under 5 who are wasted (%)
Andhra Pradesh	28.3	28.4	15.5
Assam	22.3	21.4	13.2
Bihar	39.8	37.5	21.3
Goa	18.3	25.3	27.7
Haryana	33.4	28.5	21
Karnataka	32.6	31.5	24.8
Maharashtra	29.3	30.7	24.9
Manipur	24.1	13.1	6.4
Meghalaya	36.5	22.9	13.7
Madhya Pradesh	37.5	36.5	22
Puducherry	24.7	23.3	26.1
Sikkim	22.9	12	13.2
Telangana	20.9	22.2	14.6
Tamil Nadu	25.5	21.5	19
Tripura	17.2	21.7	13.4
Uttarakhand	32.5	25.6	18.6
West Bengal	28.5	26.2	16.7

(Source: National Family Health Survey, NFHS of India, Database)

4.3 Impact of Food Assimilation

Although there are several possible effects of global warming on food intake, there is little rigorous research on the topic that concentrates on India. Generally, global warming poses a worldwide hazard because it may reduce the demand and supply of some foods that are important in the nutrition of impoverished rural and indigenous peoples, related to the production and manufacturing of food items such as fish, fruits and vegetables, and resources for food. Due to increased CO_2 concentrations, changes in climatic circumstances may result in a loss in the nutritional content of meals (lower concentrations of minerals and nutrients like zinc and iron).

Efforts to improve the quality of agricultural crops in India, particularly beans rather than meat constitute the major protein source, may hasten the widely ignored phenomenon of "hidden hunger" or under - nutrition. Under - nutrition, according to Yadav S. Shyam and others (2019), raises the risk of contracting communicable diseases, which, in response, causes more problems of under - nutrition, producing a destructive cycle. Effects of global warming that result in higher in heat and a reduction in rainfall are associated with increases in gastrointestinal illness in children, according to research from Botswana. Infants in India's destitute rural communities and urban neighborhoods have a greater risk of gastrointestinal illness cause of death and disability.

Global warming, according to Bosello and others (2012), would result in an average rise of 13.1% in gastroenteritis in the Ganga basin. Venkataraman and others (2019) also contends that global warming may reverse India's progress in lowering diarrhea (gastroenteritis) related mortality.

Global warming influence on vector borne illnesses has been thoroughly established. Global warming will result in the implementation of novel insect pest trends, which will have an effect on public health and affect the flow to properly use food, bringing new challenges to food security. More individuals will be susceptible to vector - borne illnesses including malaria, fever, and dengue, for example.

In accordance with Dhara, Yadav S. Shyam and others (2019), the whole people of India is at danger of developing malaria, with the exception of those who live over 1800 meters above sea level. Weather may have an impact on the arboviruses illnesses like dengue fever, which is spread by the mosquito, Aedes aegypti. The poor people living in cities, who live in informal housing, are especially susceptible because they lack essential services such as potable, sewage, clean water, sewer lines, and health care.

Poverty - induced under - nutrition introduces the urban poor to illnesses associated to global warming, exacerbating under - nutrition and sickness and reducing the capacity to evolve and build resistance to global warming. Due to physiological vulnerability, the negative consequences of malaria, gastroenteritis, and malnutrition have been observed to be exacerbated in youngsters. When food resources are limited, children are reported to be at increased danger.

5. Adaptive Measures to Improve Food Security and Recommendations: Conclusion

Under the light of above mentioned potential hazards associated with the climate change and global warming to the food security (i. e. food supply, food availability and food assimilation), now here we recommend some of the key adaptive measures in order to enhance, manage and improve the food security, in case of India.

5.1 Focusing Sustainable Agriculture

Stagnant productivity is India's biggest issue in agriculture. There seems to be a pressing need to increase food production in India to fulfill the country's rising food requirements. In many aspects of agriculture, production is increasing. However, considering India's agriculture's sensitivity to climate change and global warming, As a result of global warming, agriculture methods must alter. Reorganized to improve climate hazards India aims to add public spending on infrastructure. Agricultural development and distribution types that are more resistant to variations in precipitation and temperature, as well as are more nutrient and water - efficient, the goal of environmental legislation should be to improve the situation. Agricultural production and the creation of safety nets for the sake toadapt to the dangers of global warming and climate change.

Water reservoirs handling must be a crucial component of sustainable cultivation. Additional reservoirs and groundwater recharge are essential for water sustainable procurement strategies, particularly in the water - pressurize districts of north - western India. The cultivation's water consumption efficacy must be improved. The agricultural system in India has to be updated, with a focus on north - western India, the regional food supply, which is vulnerable to climate - related droughts. Irrigation water, presents several advantages, is still widely used for elevated farming systems. To increase the locality covered by small and sprinkler irrigation, the administration could shift the incentive on energy used to pull water for irrigation, that has been a significant component to diminishing groundwater resources, to sprinkler irrigation. For the water management, a membered approach is essential:

1) Enhance the efficacy of irrigation
2) Encourage small irrigation in water - scarce places.
3) Significantly more efficient planning for water resources
4) Village water tributaries are being restored.

5.2 Focusing Public Health

India does have a bad reputation when it comes to public health. Well with growing issues of global warming, officials in the nation have devoted insufficient focus to the issue on health. Regardless of the reality that the illness strain from scalar and food borne diseases is quite significant in India's city's slums and native groups, this region was disregarded in the initial National Strategy for Global warming. The Ministry of Public health is now developing a Nationwide Strategy for Health underneath the National Strategy for Global Warming's umbrella, but considering the direct link among global warming, chronic illnesses, and food assimilation, public health spending has to be significantly increased.

5.3 Focusing Livelihood Security

In the adaptation strategies under global warming, ensuring food security necessitates an enhancement in the lifestyles of the low income and food - insecure people, once again to protect them from harm poverty and starvation, and to also support them endure, retrieve from, and make adjustments to the climatic hazards they face. The National Rural Employment Guarantee Act (NREGA) of India, enacted in 2005, was a watershed moment in the timeline of alleviating poverty. NREGA seems to have had a number of good outcomes, including increased rural incomes, reduced gender earnings inequalities, improved food availability, and reduced distressed exodus from rural regions. NREGA has also contributed significantly to the betterment of children by reducing hunger and improving education and health care.

In addition, the plan aids in bioremediation and resource extraction rejuvenation in arid areas. Between 2010 and 2015, water restoration projects make up about half of all NREGA - funded programs, with 850, 000 installation work. Despite significant flaws in the program's execution, the rural low income people, notably oppressed minorities, women, lower tribe, and tribal communities, gain from it in a variety of ways. As a result, NREGA financial commitments should be preserved, and measures should be taken to more efficiently consolidate money in order to address current leaks.

Characterized by high levels of urban poverty, malnutrition, and dearth of financially lucrative jobs, there is a convincing argument for establishing full time employment in urban localities along the principles of the NREGA. This type of programme must be designed to not only give economic stability to the urban low income people, but also to build rainfall patterns of urban localities in Indian. Susceptible communities living in environmentally sensitive seaside and woodland zones will need further measures.

5.4 Focusing Urban Food Security

Because impoverished people make up the majority of India's population, this is not really a significant component to carbon dioxide emissions, but also a sufferer of global warming. Global warming, as previously said, would have a significant influence on food malnutrition of the developed areas in the territory of India. As a result, urban malnutrition requires immediate intervention. Both the availability and assimilation elements of food insecurity should be considered when addressing urban malnutrition. Improved public management networks are required to promote accessibility to healthful food. Measures should be taken to benefit from regions like Tamil Nadu that has a well - functioning public delivery mechanism and improved nutritional results.

Social standards in urban un - organized residents must be improved in order to promote food assimilation. The Swachh Bharat Abhiyan, which aspires to build 10.4 million private bathrooms and 0.5 million toilet facilities in 4, 041 municipalities while implementing systematic waste management practices, is a positive step.

Contingency planning in Indian developed areas has a dismal track history. As a result, increased government spending in weather patterns architecture is required. Flood management, sanitary facilities, and monitoring initiatives in India are all ineffective. Flooding infection hazards will be reduced in metropolitan areas with improved infrastructure.

5.5 Focusing on Natural Disaster Relief Strategies

The majority of India's emergency measures are ineffective, relatively brief, and badly designed. Furthermore, most of the focus is on giving immediate help to afflicted communities rather than establishing long - run adaptive measures. Catastrophic events have a long - run influence on agricultural output and malnutrition, although minimal attention is paid to this. "The management should allocate a threshold stipulated amount of income to impacted landless agricultural laborers as an immediate remedy, " according to a latest report by NITI Aayog. The paper advises a second economically feasible crop entitlement program for wealthier farmers out there who might desire security in addition to this help.

Considering Indian agriculture's sensitivity to climate - related catastrophic events and their long - run effects on agricultural productivity, incomes, and sustenance, such a narrow strategy to emergency aid would only fail. The administration must look at emergency funding from a long - run perspective. Furthermore, considering the negative impacts of disasters on infant health and nutrition, long - run malnutrition prevention strategies in tragedy areas must be undertaken. Substantial measures should be taken to minimize the danger in agriculture. Local producers should be the primary beneficiaries of such programmes.

5.6 Focusing Authentic Impact Assessment Research

A comprehensive evaluation of the consequences of global warming on India's agricultural production is required to design weather patterns plans and implement appropriate regulatory responses. There has been little research on the influence of global warming on other aspects of food security beyond generation as of now. Global warming influence on malnutrition and food assimilation should be assessed and quantified as much as feasible through investigation.

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