



Ministry of Health
and Family Welfare
Government of India



National Action Plan on Food Security and Climate Change



**National Programme on Climate Change & Human Health
(NPCCHH)**



National Centre for
Disease Control
Government of India



National Programme
on Climate Change
and Human Health

CLIMATE CHANGE: ACTION PLAN FOR EARLY DETECTION AND EFFECTIVE MANAGEMENT OF FOOD INSECURITY

Climate Change and Food Security

The earth environment is habitable for human beings and allows growth of food that we need to survive, function and develop. For centuries we have taken both these for granted. Global review of climate change and food security in COP26 Climate Summit in Glasgow 2021 has shown that we can no longer take these for granted and immediate and effective interventions are taken up to limit global rise to temperature to less than 1.5° Celsius. If the current trend is not halted soon, the global warming may soon cross the 2° C threshold. This will put over 1 billion people under extreme heat stress; bleach over 99% of coral reefs; intensify the melting of sea ice in summer by 10 times, leading up to 6 metres of sea level rise, double the extinction of plant species and endanger dietary diversity and food security, especially among the low- and middle-income countries and the poorer segments of population in all countries.

There will be a steep increase in frequency, duration and intensity of disasters attributed to climate-related extreme weather events. Drought, water scarcity, salinity have resulted in lower food production; there has been an increase in number of food insecure population. FAO's State of Food Security and Nutrition Report 2021 showed since 2014, there has been a rise in global prevalence of moderate or severe food insecurity measured by FIES. Nearly one in three people in the world (2.37 billion) did not have access to adequate food in 2020; 12% (928 million) of the global population was severely food insecure in 2020. New projections confirm that SDG target of zero hunger will not be achieved by 2030 all sectors, unless effective steps are taken to improve food production and diversity and address inequality in access to food.

Even though the contribution of India and the LMIC to GHG and global warming has been relatively low LMIC are likely to face severe adverse impact of climate change on food security. The poorer segments of the population in India will face major adverse impact of both climate change and acute and chronic food insecurity.

Three broad categories of action are required to combat climate change and its adverse consequences in relation to food security :

- cut emissions,
- adapt to climate change and
- evolve and implement programmes to mitigate adverse impact of climate change.

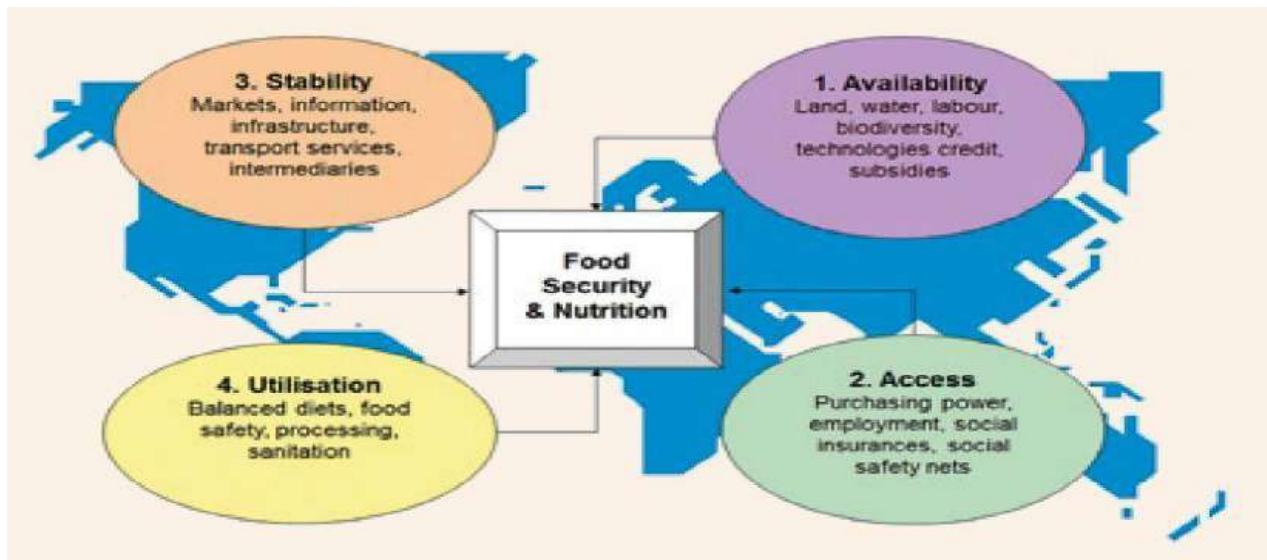
Each of these requires investments in technology, innovations, financial and human resources urgently. India is rich in human resources and by appropriately harnessing them country has to can innovate and adapt to climate change and mitigate its adverse consequences .

SITUATION ANALYSIS

Food security

Food is an important determinant of nutrition and health status. Therefore food security of the population especially the vulnerable groups had received priority attention both globally and in India. In the 1950s and 1960s food security was defined as consuming sufficient protein and energy (food

quantity). In the 1980s the importance of micro-nutrients for a balanced and nutritious diet (food quality) was recognised . Problems in absorption of nutrients (eg diarrhea), or excessive loss of nutrients (eg respiratory infections) can adversely affect food utilization even if adequate amounts are consumed . The third dimension– food utilization has become increasingly prominent in food security discussions since the 1990s.



The World Food Summit in 1996 redefined food security: “Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.”

FAO’s assessment of Prevalence of undernourishment (low dietary intake)

FAO undertakes assessment of the prevalence of undernourishment using Minimum dietary energy requirement (MDER: FAO 2016). MDER is computed from NHANES and is the intake that is adequate to maintain the minimum acceptable BMI of adult men and women engaged in low physical activity.

Comparison between US and Indian men and women				
	US men	US women	Indian Men	Indian women
Height	178 cm	165 cm	163 cm	152 cm
PAL	1.6		1.4	

Minimum acceptable BMI for US citizens was 5th percentile Minimum acceptable weight for this BMI was used to compute BMR PAL used was 1.55 for males and 1.56 for females. Computed MDER: 1802 Kcal/capita/day. Prevalence of undernourishment is computed as % of population in the country consuming less than 1800 kcal/day. Computed

undernutrition rate in Indians using this metric is about 14 % . This comparison may not be appropriate because Indians a small statured , have a lower BMR and also a lower PAL

Energy requirements of Indians

	ICMR 2020	Energy req	current ht	Optimal wt	Energy req
Man/sed	65 kg	2100 kcal	163 cm	54 kg	1720 kcal
Women/sed	55kg	1660 kcal	152 cm	47 kg	1420 kcal

In 2020 Indian Council of Medical Research and National Institute of Nutrition released the Report of the Expert Group on Nutrient Requirements of Indians. The computed EAR for energy requirements for the aspirational reference man weighing 65 kg and adult women weighing 55 kg was 2100 and 1660 Kcal /day respectively. However appropriate weight (BMI of 21) for average adult height was 54Kg for men and 47Kg for women and the energy requirement for average man and women are 1720 and 1420 Kcal respectively.

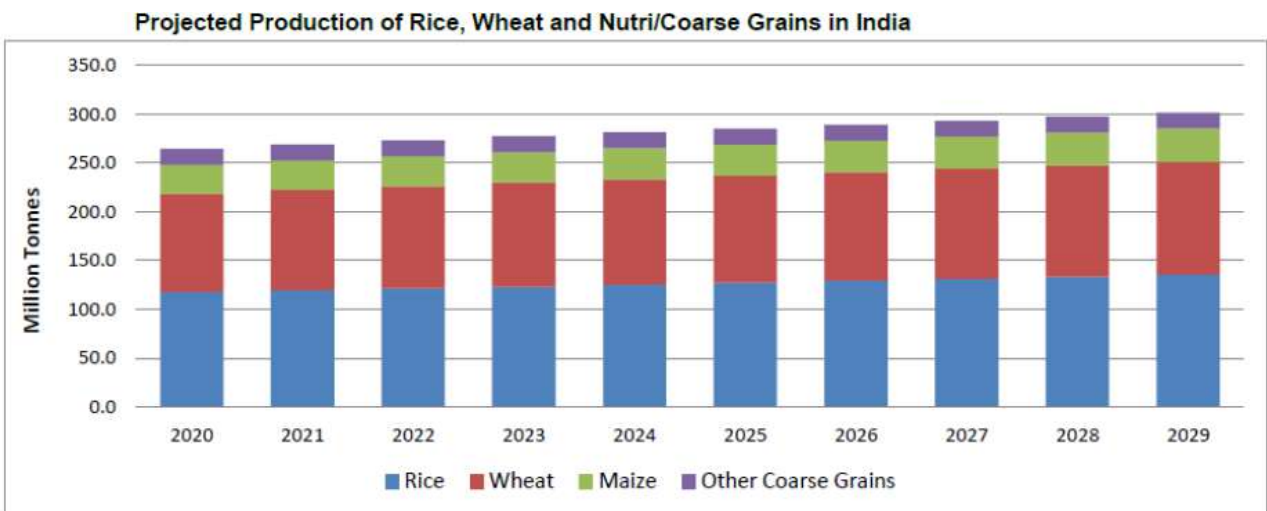
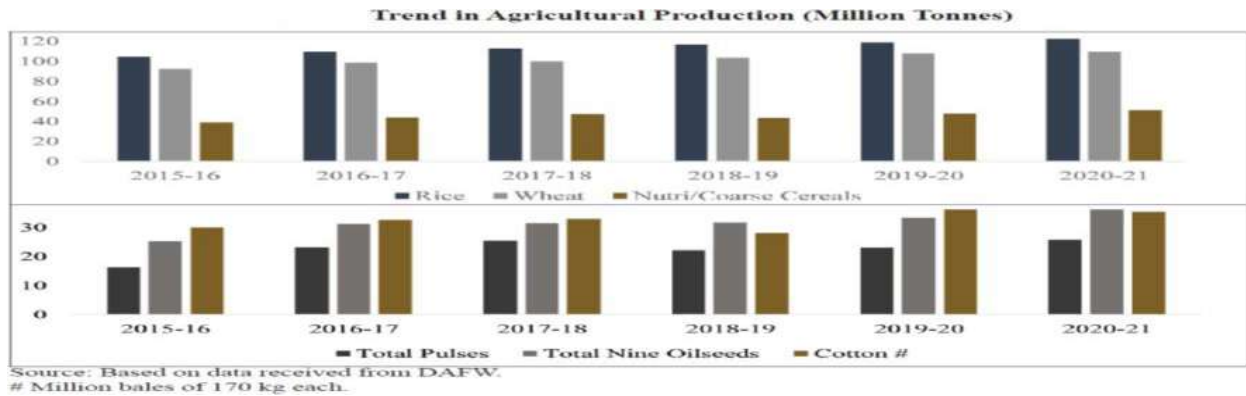
NNMB 2012 survey reported median energy intake of 1850 for sedentary men and 1660 for sedentary women . NIN is computing MDER for Indians from NNMB data. Computed prevalence of undernourishment (low dietary intake) on the basis of energy requirements of Indians, the rates will be far lower than the reported 14%.

Habitual Indian Diets intake of Indians

In the last two years the EAT RIGHT movement has advocated predominantly plant based balanced diet as the ecologically and economically sustainable method of meeting food needs for optimal nutrition and health for the growing population. Indian diets are predominantly plant-based. The Nutrient Requirement Report provides a sample Balanced meal for Indians which is predominantly plant based, which will provide needed macro and micronutrients, anti oxidents and dietary fibre needed to maintain optimal nutrition and prevent overnutrition. Such a diversified balanced meal can enable ecologically and economically sustainable crop diversification and improve farmers income.

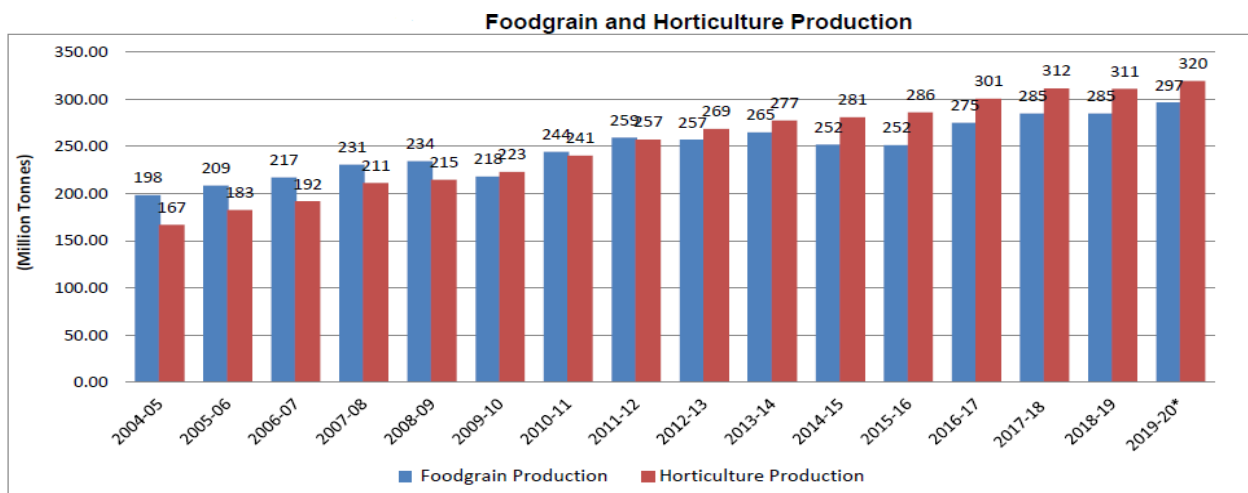


Food production



Source: OECD- FAO Agriculture Outlook (2020-2029)

India has been self-sufficient in food production for the last four decades and has been the net food grain exporting country for over a decade. Projected production of food grains till 2030 indicate that the country will remain food secure and self-sufficient in food grain production .

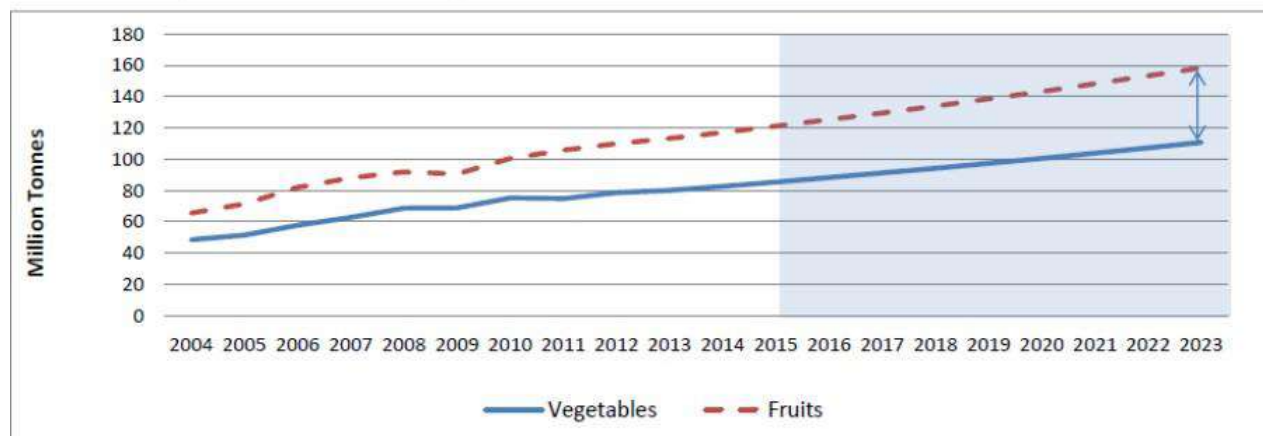


Source: Department of Agriculture, Cooperation & Farmers Welfare

*4th Advance Estimates for Foodgrain production and 3rd Advance Estimates for Horticulture Production

The country is No 1 or 2 in most vegetable production in the world and produces enough vegetables to meet the per capita vegetable intake requirements. However, diet surveys indicate that actual intake is far lower especially in poorer segments of the population. This is partly due to high wastage of the vegetables due to lack of storage facilities, resulting in glut and economic loss to the farmer; periodic scarcity and high cost of the vegetables lead to lower vegetable consumption especially in the poorer segments of the population.

Projected Production of Vegetables and Fruits in India



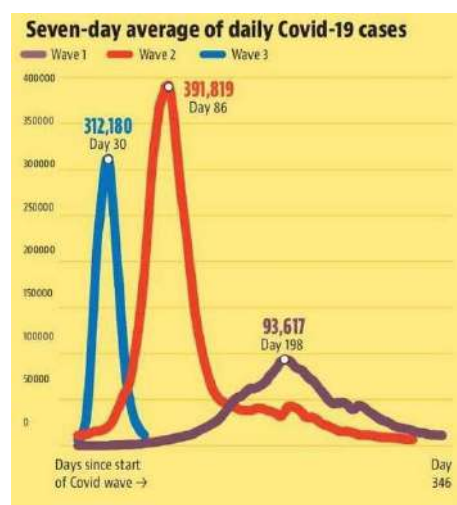
Source: OECD- FAO Agriculture Outlook (2014-2023)

National food security Act

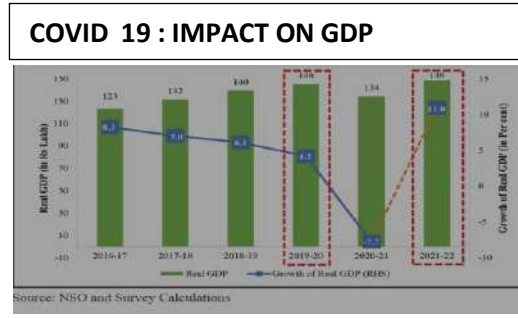
India was the first country in the world to provide subsidised food grains as a legal entitlement to over 67% of its citizens. The National Food Security Act aims to improve household food security through this entitlement. Priority households are entitled to 5 kgs of foodgrains/person/month. The poorest of the poor (Antyodaya) households are entitled to 35 kgs/household/month. The combined coverage of Priority and Antyodaya households (called “eligible households”) is up to 75% of the rural population and up to 50% of the urban population. During the COVID epidemic provisions under NFSA was utilised to provide free food grains and two hot cooked meals to all persons who needed them and came to the facilities to access them between April 2020 and November 2020. This measure prevented acute food insecurity especially among labourers who were left jobless during lock down and subsequent slow improvement in employment and low emoluments. It is expected that the NFSA will continue to provide the food grains needed for ensuring food security among the poor and vulnerable segments of the population.

Response to COVID pandemic

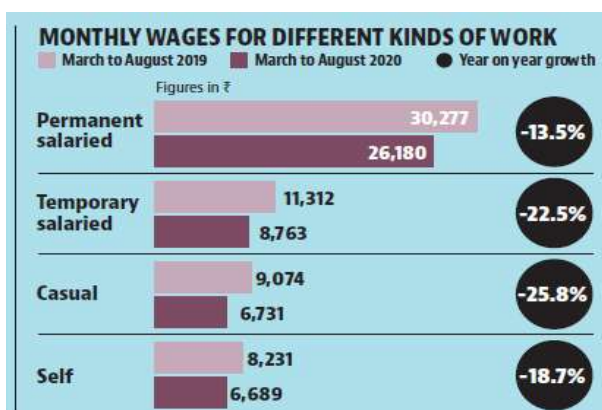
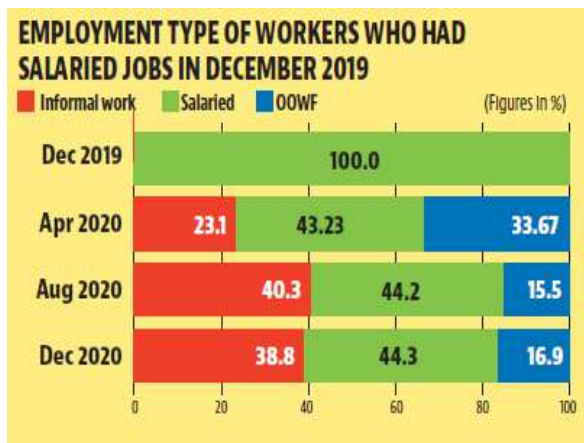
Between January 2020 and March 2022 India experienced three waves of COVID19 epidemic. Stringent lock down in 2020 ensured flattening of the epidemic curve in the first wave and enabled health system to gear up to tackle the epidemic. The loss of life was minimised but cost in term of fall in GDP, and livelihood loss and economic distress was immense. The second wave was in 2021 devastating in terms of loss of life, but as lockdown was of short duration the economic consequences were not very severe. The third wave in 2022 was short with steep rise in number of cases; but loss in terms of life or livelihood has been relatively low.



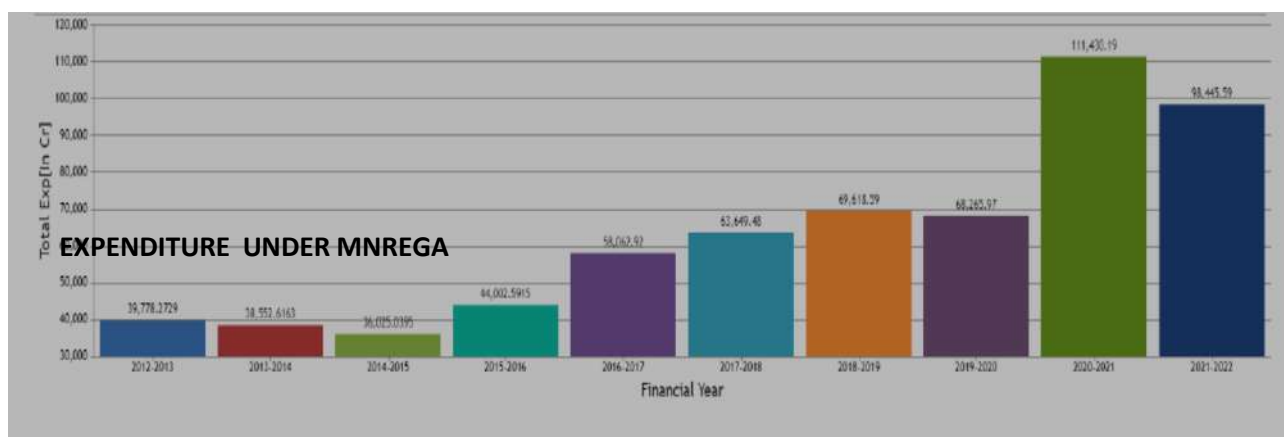
Stringent and prolonged lock down in 2020 resulted in a steep fall in GDP. There has been recovery since unlocking began; however, the country is yet to get to the pre-COVID trajectory of GDP growth. During 2020, there was a steep rise in unemployment and earnings across all employment categories.



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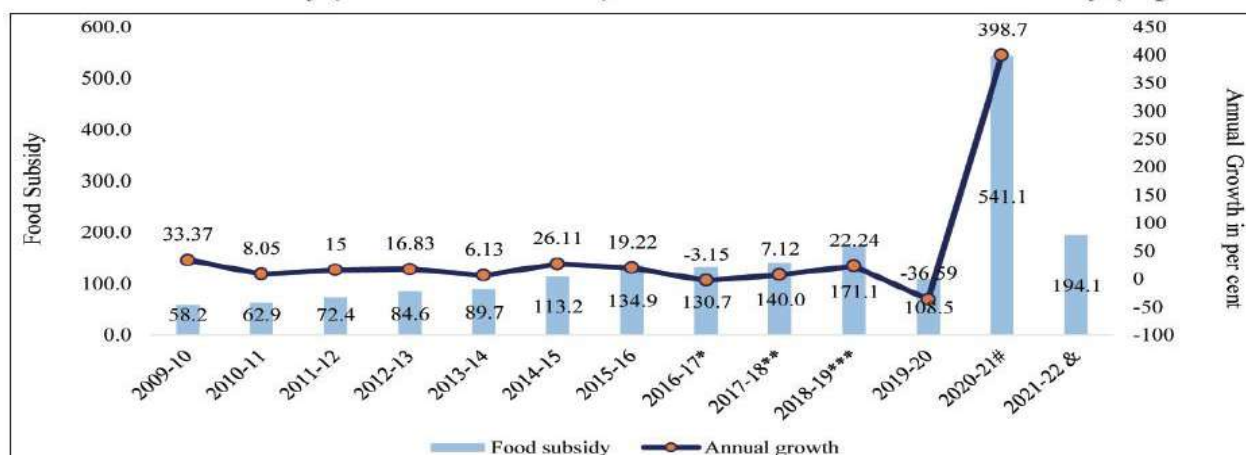
EXPENDITURE UNDER MNREGA



To cope with the situation, employment under MNREGA was provided so as to enable families to have wages to tide over the crisis. This resulted in a steep rise in the expenditure under NREGA. In addition, cash transfers were also made to assist the families to cope with other essential requirements.

To prevent the economic distress from leading to food insecurity, the country provided 35 kg cereals and 5 kg of pulses free of cost to all ration card holders between 1.4.2020 and 30.11.2020. In addition to this, almost all cities in the country had organized the MDM kitchens to cook and provide two meals for all those who came to the food distribution centres. These measures ensured that despite massive unemployment and reduction in wages, the poorer segments of the population were able to ward off hunger. Highly subsidised food grains and also free food grains were provided by the center and the states during 2021-22 also. This was possible because of good food production and ample stores during the period. The COVID pandemic demonstrated not only the country's ability to cope with severe shocks and also the resilience of the population in their attempt to get back to the pre-COVID status as early as possible.

Food Subsidy (in ₹ thousand crore) and Annual Growth in Food Subsidy (in per cent)



Source: Based on data received from DFPD.

These measures ensured that despite massive unemployment and reduction in wages, the poorer segments of the population were able to ward off hunger

ACTION PLAN TO MINIMISE FOOD INSECURITY DUE TO CLIMATE CHANGE

Efforts have to be taken to ensure that green house gas emissions do not continue to increase at the current rate and result in rise in global temperature. Such efforts have to take into account the current disparity in percapita green house gas emissions and ongoing efforts in developing countries to improve the quality of life of their citizens. While developed countries focus their efforts on reduction in fossil fuel burning and emissions through improved technologies, efforts reduce fossil fuel emissions in developing countries should take into account the current percapita emission rates and how to prevent large increase in emissions without compromising the socioeconomic development

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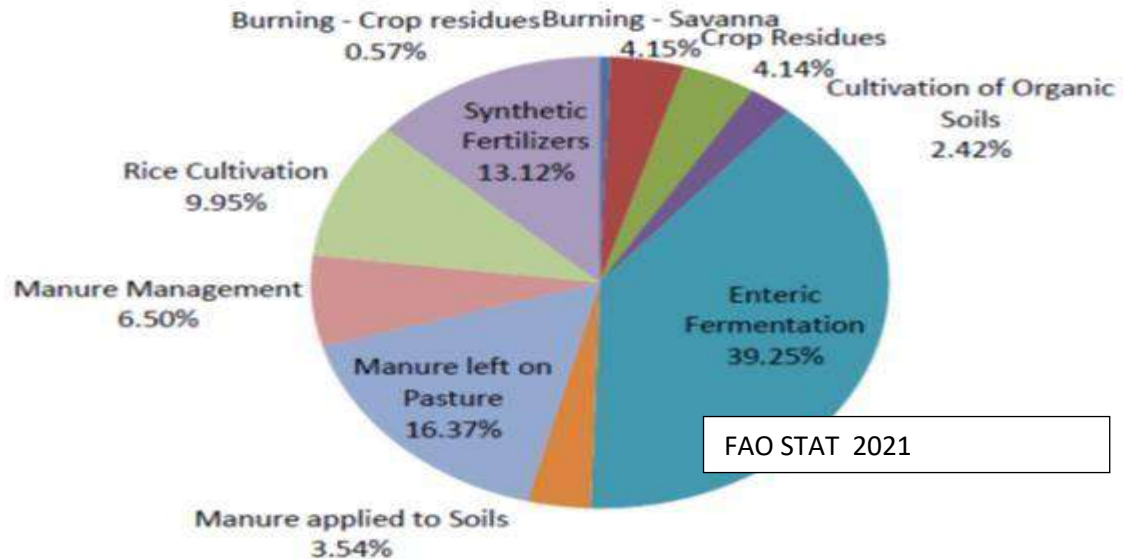
CUT GHG EMISSIONS

The primary efforts to halt rise in GHG emission and global warming is through funding technologies for clean energy production and industrial processes. This has to be addressed immediately to ensure that the planet remains livable but there has not been any clear-cut commitment regarding funding or timelines.

Food systems contribute about one fourth of the global GHG emissions, mostly methane. Agriculture can contribute to halting further rise in GHG by

- investing in plant-based food production,
- better storage, and
- processing of food especially perishable vegetables, fruits, and animal products to reduce wastage-related methane emission at all levels.

Source-wise total GHG Emissions from Agriculture sector, 2018



Improvement in post-harvest practices, aimed at reducing wastage and increasing shelf life of the perishable foodstuff especially vegetables and fruits will help in improving access to diversified food with adequate vegetables at affordable to meet the nutritional requirements of the population. They will also help in reducing methane emission during the wasted food rotting .

WASTAGE REDUCTION: PROCESSING OF VEGETABLES BY DRYING (INDIA)



Overall, animal-based products have a higher ecological footprint (including land demand for rearing animals and growing fodder) than most plant-based foods and are responsible for two-thirds of food-related greenhouse emissions. Global data indicate that the demand for animal-based foods increases with increase in percapita income. Global demand for animal based food products

is projected to grow by 68% over the next three decades. Indian diets are predominantly plant based. Nutrition professionals can play the critical role in convincing the population to continue the to predominantly plant-based diet. Predominantly plant based diet of billion plus population will help in reducing GHG emissions related to animal husbandary for meat production ; Plant based diets are not only ecologically and economically sustainable but they will promote optimal food intake and reduce the risk of noncommunicable disease. .

ADAPTATION TO CLIMATE CHANGE

In the past agriculture had adapted to climate change – as seen by the existing agricultural diversity. It can therefore be expected to adapt to ongoing climate change also. However current changes are too large and are happening at too rapid a pace and therefore the evolutionary mechanism will not be able to adapt to the change in the time frame available.

Agricultural scientists have to play a major role to substantially hasten the process of adaptation and advising farmers on crops, varieties or breeds of crops, with different environmental optima and/or broader environmental tolerances which they could grow .

When Met Dept predicts monsoon failure in drought-prone regions Agriculture Deptt advises farmers to sow pulses and millets instead of cereals.

Diversification of crops will improve soil health and helps in reducing the risk of individual crop failure and its adverse consequences. Integrated pest management and disease control will play a critical role in preventing infestation-related crop losses due to unseasonal rains and high moisture content.

MITIGATING ADVERSE IMPACT OF CLIMATE CHANGE ON FOOD SECURITY

FAO assesses food security on the basis of dietary energy consumption <2100 Kcal/day. Prevalence of energy consumption below 2100 Kcal is taken as prevalence of undernutrition (POU) indicative of food insecurity.FAO monitors food insecurity at global, regional and national levels. Currently food insecurity on the basis of is calculated every year for every country, based on the reports from member countries and is reported in the FAO publication SOFI .Adjustments to the series are made as better information on the parameters is obtained

Realisation that mere energy adequacy does not imply food security has led to the development of Food Insecurity Experience Scale (FIES). FIES is based on interviews regarding people's direct experience in their lives. FIES reports moderate and severe food insecurity depending on the peoples response to the specific questions regarding adequacy of food. The data is qualitative and is based on the perception of the person surveyed but has the advantage of not being based on arbitrary level of energy consumption.

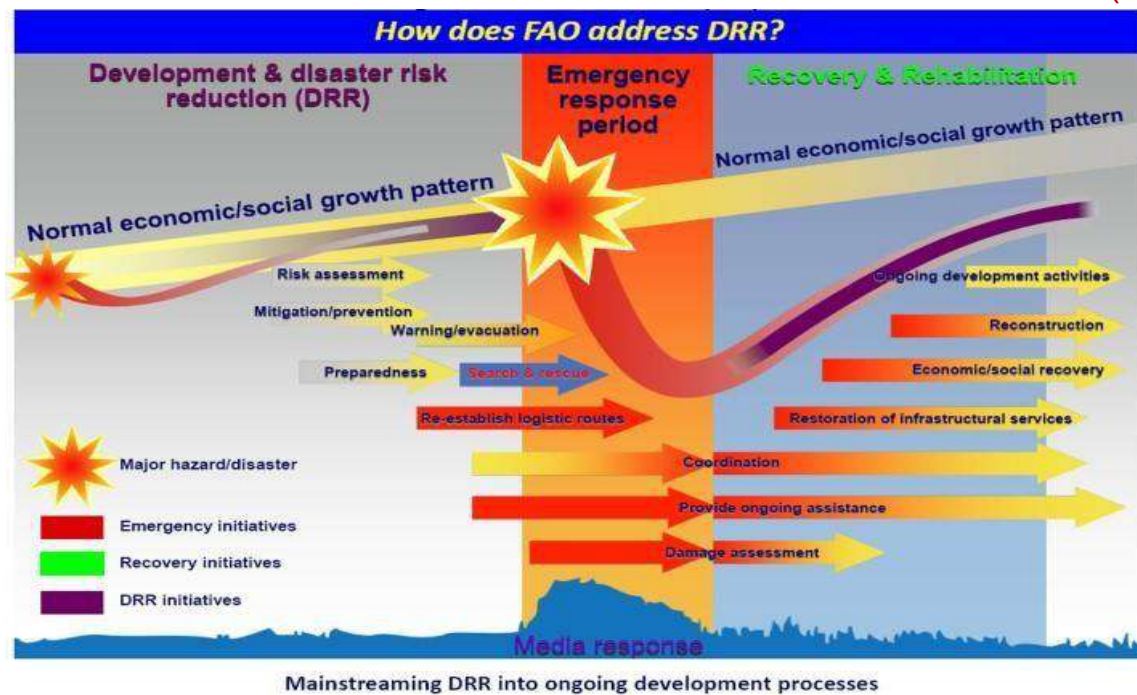
Food insecurity can be Acute or Chronic. Climate change increases frequency, duration and intensity of extreme weather related disasters such as cyclones, floods , mudslides etc. Improved early warning systems and effective disaster management programmes will mitigate the scale of human toll and suffering. Acute food insecurity is usually associated with natural or man-made disasters and management of acute food insecurity is an important component of disaster management. If disaster management is effective and the duration of food insecurity is short, impact of acute food

insecurity on health and nutritional status is transient. Disasters do have an adverse long-term impact on livelihood and earning capacity. Efforts have to be made to ensure that the post-disaster rehabilitation programmes are energetically implemented so that the families do not slip into poverty and chronic food insecurity. Severe and prolonged acute food insecurity (famine) is associated with severe acute undernutrition. Famine is life-threatening. Energetic and effective interventions for improving dietary intake and ready access to health care can reduce the adverse impact of famine on the nutrition and health status of the affected population. Prolonged post-famine rehabilitation will be required.

Action Plan to minimize acute food insecurity during climate change disasters in India

Acute food insecurity in India is seen mostly due to weather related events such as cyclones, storms, floods. With climate change the number, duration, and intensity of weather related disasters will increase ; disasters may be seen in areas which had not been earlier identified as disaster prone. Improved early warning systems and effective disaster management programmes will mitigate the scale of human toll and suffering.

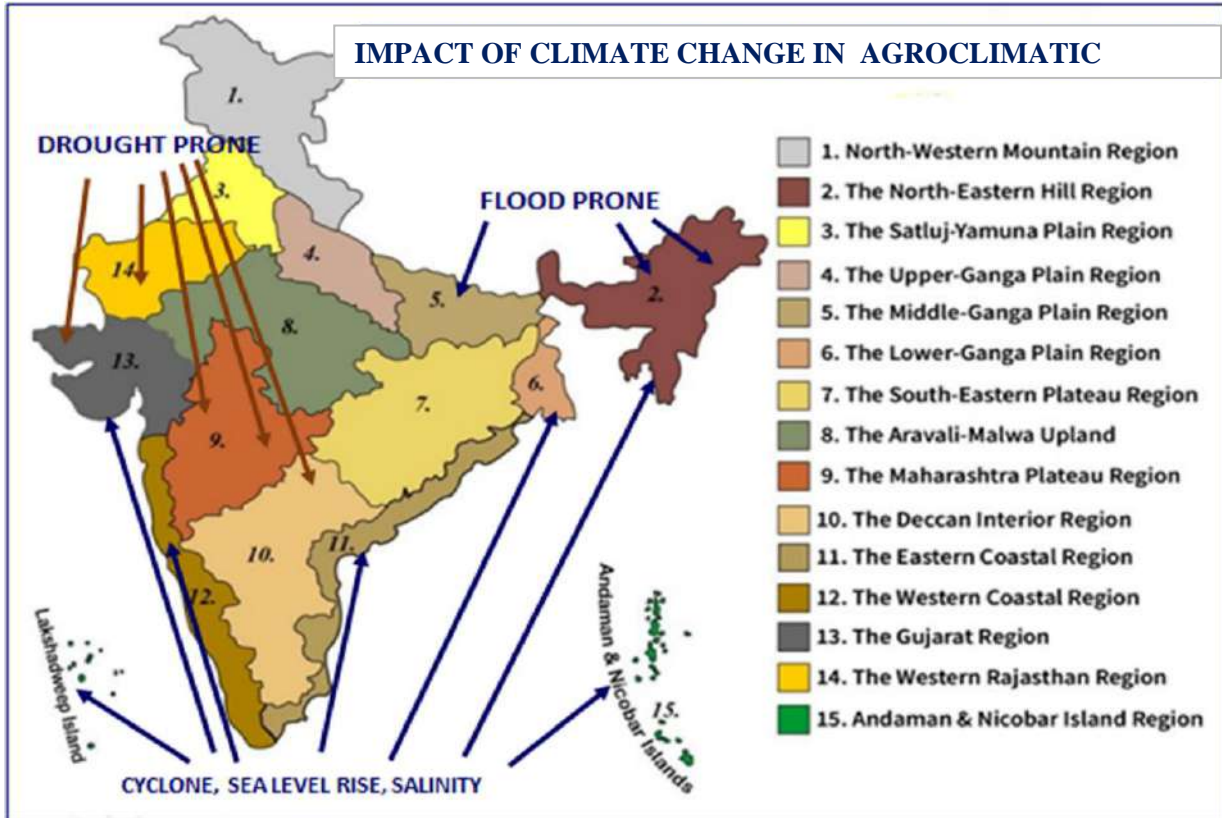
ACUTE FOOD INSECURITY :DISASTER RISK REDUCTION (DR



Natural disaster prone areas in India have been mapped out. Met Department provides early warning of the weather related events . The principles and practice of disaster management include management of acute food insecurity and poor access to safe drinking water are the same whether disaster is related to climate change or not. India and its states have robust management programmes to cope with disasters and the immediate toll from climate changes disasters is fairly low.. Experience gained in disaster management earlier will help in effective management of climate change induced increase in number duration and intensity of the disasters.

India the post-disaster rehabilitation is suboptimal and tardy. This may result in under- employment reduction in income and chronic food insecurity. This requires priority action in the months following disaster.

IMPACT OF CLIMATE CHANGE IN AGROCLIMATIC

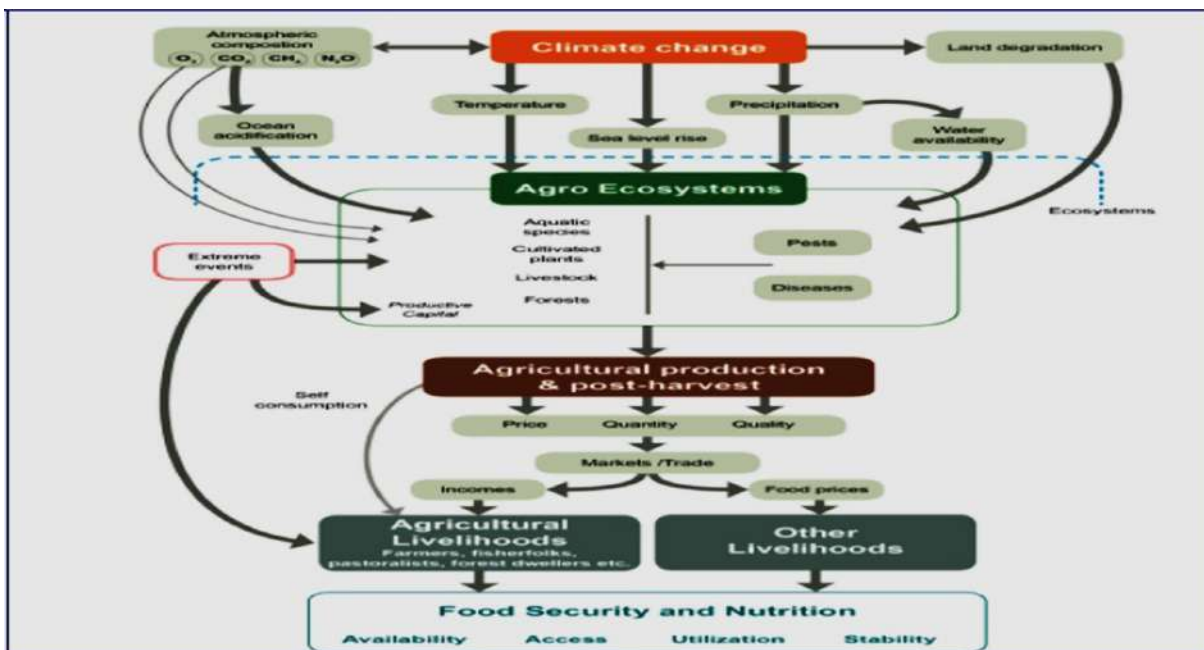


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Action Plan for management of Chronic food insecurity and climate change

Impact of climate change on chronic food security is secondary to its impact on agriculture or food prices. Though climate change is a global phenomenon, there are substantial inter-country and within



large countries inter- states differences in impact of climate change on food security. Chronic food

insecurity can be transient ie short term and temporary (eg during drought), or long term and persistent (eg poverty in marginalized population groups) and leads to leads to inadequate food consumption . Persistent chronic food insecurity and low food consumption results in undernutrition and micronutrient deficiencies. Identification of vulnerable groups of population regions

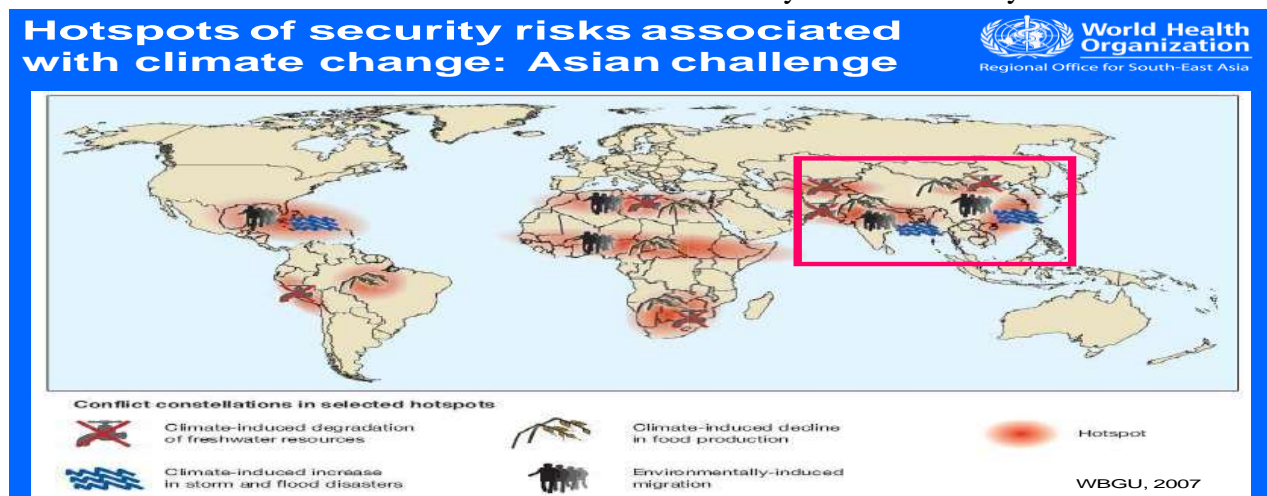
Impact of climate change on food production and food availability has been well documented. But it now recognised that climate change can affect all four dimensions of food security: food availability, economic access to food, bioavailability, and utilization of nutrients and stability of all these three dimensions. At national level, exposure to climate risks can trigger shocks on agricultural production and food availability, with risks of market disruptions, effects on supply and storage systems, as well as increases in agricultural commodity prices (food and feed), impacting accessibility and stability of food supplies for the entire population, particularly in countries with significant shares of the population spending a large part of their income on food. This adversely affects macro-economic conditions in countries where agriculture is an important part of GDP and/or constitutes an important source of employment. At the farm/household level, climate change may reduce income level and stability, through reduction in productivity and increase in production costs. Reduction in production or purchasing power e can lead to food insecurity and reduction in dietary intake which could result in wasting and micronutrient deficiencies ..

WAY FORWARD: COPING WITH CLIMATE CHANGE

In the 26th Conference of Parties (CoP 26), India had committed to achieving the following targets:

- increase its non-fossil energy capacity to 500 gigawatts (GW) by 2030,
- meet 50% of its energy requirements from renewable energy by 2030,
- reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030
- reduce the carbon intensity of its economy by 45% by 2030
- achieve the target of Net zero carbon emissions by 2070

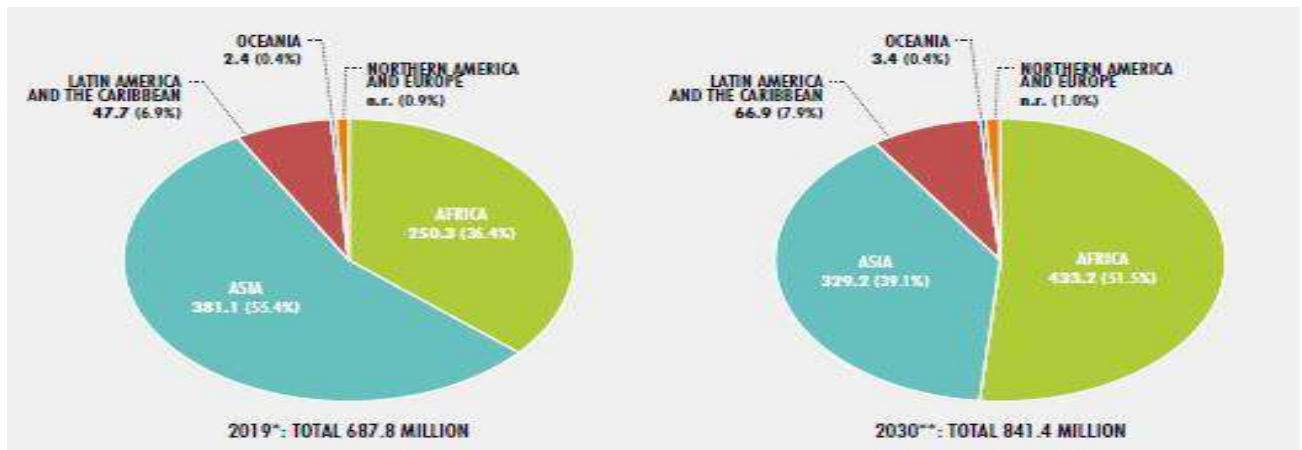
It is imperative that all efforts are made to ensure that India fulfills the commitments given in CoP26 in 2021 and also achieves sustainable food security for all Indian by 2030 .



WHO and FAO estimates and projections suggest that Asia especially India and China are extremely vulnerable to climate change related risks. There will be an increase in acute food

insecurity due to increase in number severity and duration of natural calamities associated with climate change. Increase in chronic food insecurity due to fall in food production because of climate change related reduction fresh water resources and climate change induced increase in drought. Unseasonal rains and moisture will increase food loss due to pests and diseases. Increase in chronic food insecurity will also be due to rising food costs of food as well as reduction in purchasing power due to joblessness, agricultural labour migration.

Asia is one of the worst affected continents; because of the high population Asia will have highest proportion and number of persons suffering from adverse consequences of climate change



FAO has taken the current position and projections till 2030 in food production to meet the needs of the growing population and has predicted that by 2030 the share of Asia (mainly India and China) in undernourished persons will come down from the current 55% to 39% by 2030 despite being the worst affected region by climate change. Achieving a substantial reduction in food insecurity despite being the worst affected region by climate change will not be easy but it is worthwhile to turn this challenge into an opportunity.

DETAILED ACTION PLAN MINISTRY WISE

Efforts have to be taken to ensure that green house gas emissions do not continue to increase at the current rate and result in rise in global temperature. Such efforts have to take into account the current disparity in percapita green house gas emissions and ongoing efforts in developing countries to improve the quality of life of their citizens. While developed countries focus their efforts on reduction in fossil fuel burning and emissions through improved technologies, efforts reduce fossil fuel emissions in developing countries should take into account the current percapita emission rates and how to prevent large increase in emissions without compromising the socioeconomic development

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Each of these requires investments in technology, innovations, financial and human resources urgently

The primary efforts to halt rise in GHG emission and limit global warming by funding technologies for clean energy production and industrial processes. This has to be addressed immediately to ensure that the

planet remains livable but there has not been any clear-cut commitment regarding funding or timelines. However efforts to reduce GHG emission in relation to agriculture and animal husbandry , food wastage are being taken up.

Climate change adaptation and mitigation

One of the major problems is that the current high GHG concentration in the earth's biosphere will persist for several decades.

Even if Herculean efforts are made and the emissions are reduced, CO₂ and global temperatures will remain high.

Three broad categories of action are required on global level: cut emissions, adapt to climate change and evolve steps to mitigate its adverse impact.

Each of these actions requires investments in technological innovations, human and financial resources.

While developing countries do have the human resources for undertaking the task, investment in technology and financial resources have to come from the developed countries.

The success with which developing countries achieve developmental transition and reduce emissions will determine the region's ability to lift millions from the poverty and food insecurity, and help the world to secure the overall liveable climate transition.

Food security and optimal nutrition depend upon critical inputs from several sectors and line ministries. Action plan for early detection and effective management of adverse consequences of climate change on food security depends on diverse Ministries and institutions . Action plan is indicated Ministry wise beginning with the Ministry of Health and Family welfare

Ministry of health and family welfare

Ministry of health and family welfare has the pivotal role o

- providing nutrition education regarding appropriate predominately plant based dietary intake for optimal health
- monitoring of the food security and nutritional status of the population for early detection and effective management of climate change related food insecurity
- initiate timely interventions to combat any increase in food insecurity or under nutrition
- alerting other ministries as and when there is any increase in food insecurity so that they could initiate steps under their domain

As a part of efforts to minimise the adverse impact of climate change on food security and nutritional status , it is essential to monitor food insecurity using FIES, prevalence of undernutrition and anthropometric indicators is essential for early detection of undernutrition especially in vulnerable segments of population. As an when an increase in chronic food security or undernutrition appropriate steps will have to be taken to minimise these adverse consequences of climate change .

Monitoring food insecurity

Prevalence of under-nutrition (POU)

Historically POU was assessed by dietary energy consumption <2100 Kcal/day and used to monitor food insecurity at global, regional & national levels . POU is calculated every year for every country, based on the reports from member countries and is reported in the FAO publication State of World Food Insecurity (SOFI) .

Food Insecurity Experience Scale (FIES)

Realisation that mere energy adequacy does not imply food security has led to the development of Food Insecurity Experience Scale (FIES). FIES is based on interviews regarding people's direct experience in their lives. It assesses people's perception whether the food they are currently consuming is adequate, appropriate and diverse and if not the reasons for the short fall. Based on these assessment FIES reports moderate and severe food insecurity.

Anthropometric indicators

Anthropometric indicators such as height, weight and body mass index (BMI) are widely used for assessment of chronic food insecurity. In children especially under five children, stunting, underweight and chronic wasting are considered as indicative of chronic food insecurity.

It is expected that health and Wellness clinic and the primary health care system will play a pivotal role in this task.

Nutrition education on balanced plant based food for optimal health

Expert group on Nutrient requirements for Indians have revised the earlier document and has recommended optimal nutrient requirements which can be met by diverse predominantly plant based diets. Such a diversified balanced diet will provide needed macro and micronutrients, anti oxidants and dietary fibre needed to maintain optimal health. It is ecologically appropriate, provide crop diversification and improve farmers income and prevent overnutrition and reduce risk of non communicable diseases. Health professional at all levels should strive to provide nutrition and health education so that the population switches over to this diet.

District wise mapping and identification of districts requiring intervention

NITI Aayog has put in their web site to the district wise mapping (for aspirational districts as well as all districts) of nutritional status of children and adults, prevalence of anaemia in children and adults. Coordinated interventions to improve food security and nutritional status include interventions by Employment programmes (MNREGA), food grain provision under NSA through PDS, ensuring that food supplementation programmes (MDM and ICDS) are fully operation.

Meteorology Department

Met Dept plays a major role in predictions of extreme weather events so that the adverse consequences of these disasters can be minimised. Met Dept predictions regarding drought or monsoon failure priority helps agriculture Dept to advise what to grow when and where to prevent fall in food production and rise in food insecurity.

Each state/district will have to download the data and draw up priority interventions based on the POSHAN 2 targets. Strengthening ongoing nutrition surveillance & monitoring is essential to assess adverse impact of the climate change on nutritional status and impact of interventions to minimise them.

Ministry of water resources

Water is a scarce resource; adaptation to improve water availability will include water harvesting and storage, access to irrigation, improved irrigation technologies, as well as agronomic practices such as minimum tillage and increase in soil carbon and organic matter which enhance soil water retention.

Ministry of Forest and environment

Other practices for minimizing climate change-associated risks include forest fire management, reduced logging, limiting of gathering of non-wood forest products or livestock grazing in forests, and restoring degraded forests to healthy sustainable levels.

Ministry of agriculture

Currently India is self-sufficient in production of food grains pulses, milk, fruits and vegetables. Building up a resilient diversified agricultural system better equipped to cope with the stress of global warming, recover from damage and adapt to changes should receive high priority. Adaptation measures for crops can include the use of adapted varieties or breeds, with different environmental optima and/or broader environmental tolerances, diversification of varieties or crops as a method to hedge against risk of individual crop failure and integrated pest management and disease control.

Every year district-specific advice to the farmers on what crop to sow and when is provided by the Deptt of Agriculture based on the predictions regarding monsoons of the Met Deptt. Increase in drought prone areas will adversely affect cereal production and animal husbandry assets. Increase in investment in pulse and millet cultivation in such areas can substantially mitigate the impact

Unseasonal rains and increased humidity may increase post harvest losses and the chances of contaminations of produce such as aflatoxin in groundnut. Surveillance and monitoring for these are to be built up and used. Improvement in post-harvest practices, aimed at reducing wastage and increasing shelf life of the food stuffs will also be of help. Improving processing and storage of vegetables and fruits will reduce waste related GHG emission and make vegetable available at affordable cost through out the year for the population

Employment to improve purchasing power

Loss of livelihoods and purchasing power of rural poor due to climate change can adversely affect household food security and dietary intake; when persistent these may adversely affect nutritional status especially of the vulnerable groups. In affected areas increasing non farm employment, focussed efforts to improve employment under NREGA, improvement supplementary feeding under ICDS and MDM can help mitigating the adverse impact on food security and nutritional status

Public distribution system

The National Food Security Act aims to improve household food security through this entitlement. Priority households are entitled to 5 kgs of foodgrains/person/ month. The poorest of the poor (Antyodaya) households are entitled to 35 kgs/household/month. The combined coverage of Priority and Antyodaya households (called “eligible households”) is up to 75% of the rural population and up to 50% of the urban population. This system has to be sustained so that vulnerable segments do remain food secure despite being affected by adverse consequences of climate change.

Food supplementation programmes

ICDS and MDM are the largest food supplementation programmes covering children, pregnant and lactating women. Monitoring nutritional status of these three vulnerable segments and providing food supplements will be one of the major interventions to combat food insecurity and undernutrition associated with climate change.

Surveillance System for food security

At present, there is no centralized surveillance system for food security in the country which records and reports changes in

- availability of food,
- access to food and
- the utilization of food.

These three domains fall under different departments; each department has a system of following what is happening at the district and state levels in their domain.

The table below provides information on Deptts collecting the data pertaining to these three domains. A pilot effort can be initiated to build up surveillance system for food security at state level and later at district level, utilising the data collected by each of these line departments

Food security	Climate change related event	Surveillance :Action taken	Monitoring the response
Availability of food	Unseasonal or unexpected changes in temperature, and rain; monsoon (predictions by Met Deptt)	Advise to the farmers on what crops to sow and when (Deptt of agriculture)	Crop sown area Advance estimates of food production Estimates of production in Karif and Rabi seasons (Deptt Agriculture)
	Drought prediction (Met Deptt)	Advise to farmers what to grow in prone areas	
Access to food	Economic access	NREGA (Ministry of rural development)	No who applied , No of days of employment (Ministry of rural development)
		Consumer price index	CSSO monitors consumer price index
	Physical access	Provision of PDS for subsidized food grains Deptt of Civil Supplies	Offtake of food grains Deptt of Civil Supplies
Utilisation of food (poor absorption and nutrient loss due to infections)	Food safety	Monitoring and surveillance of food safety m(FSSAI, Deptt of Health)	Disease surveillance for food borne infections (MOHFW)
	Infections	Infectious disease surveillance for Seasonal and unseasonal infections (MOHFW)	Infectious disease surveillance Climate change-related changes in infectious diseases MOHFW