# TRENDS IN AGRICULTURAL PRODUCTION AND PRODUCTIVITY WITH RESPECT TO FOOD AND NUTRITIONAL SECURITY

**Abstract**

The level of productivity in the agricultural sector should be one of the primary priorities of food and nutritional security. The satisfaction of household food security and nutrition needs, the provision of employment possibilities, the increase in rural income levels and the alleviation of rural poverty are some of the advantages associated with agricultural development. According to FAO, extensive hunger and malnutrition remain serious issues in many parts of the world. At the current rate of progress, hunger won't be totally eliminated by 2030 and most definitely not by 2050. Growth in agricultural productivity has slowed recently. While the recent rate of population increase in the world is about 1.2 percent, the average yearly growth rate of productivity of the major agricultural crops is still quite low at about 1.3 percent. For the purpose of enabling to feed the predicted growing global population, food and nutritional security is a fundamental challenge in global agriculture. The continuing increase in agricultural production and output can support meeting basic needs, battling starvation, lowering dependency on imports, encouraging economic sustainability, balancing the trade, and enhancing food and nutritional security. Therefore, along with diversification, production intensification and improving input or resource usage efficiency are important critical initiatives.

**Keywords:** Agricultural, Production, Productivity, Food and Nutrition Security

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## I. INTRODUCTION

Developing the agricultural sector is crucial for enhancing nutrition and food security. Its functions include expanding food availability and diversity, stimulating economic change, and functioning as the primary source of income for the poorest people of the world. Various studies have shown that boosting food security and nutrition requires development in both agricultural and economic growth, so that the agriculture can support the economic expansion.

As per the Economic Survey 2020-2021, the contribution of agriculture to GDP has raised to approximately 20% for the first time in the last 17 years, making it the only sector showing promise for GDP growth in 2020–21. The percentage of the GDP that agriculture contributed increased from 17.8% in 2019–20 to 19.9% in 2020–21.

In addition, the production increased the National Food Security Act's (NFSA) distribution of food grains, which increased by 56% from 2019 to 2020. Up till December 2020, the Government will have distributed 943.53 lakh tonnes of food grains to the States and UT. The amount of food produced has increased. As a result, we are now self-sufficient and a net exporter of agricultural and related goods, as opposed to being a food-begging bowl following independence.

Developing agriculture is one of the most effective solutions to reduce extreme poverty, improve shared prosperity, and feed an anticipated 9.7 global population by 2050. The agriculture sector's expansion is two to four times more productive than growth in other industries at lifting the incomes of the most vulnerable populations.

However, food security, poverty alleviation, and growth generated by agriculture are all at risk: Crop yields may decrease as a result of climate change, particularly in areas with the greatest food insecurity. About 25% of greenhouse gas emissions are attributable to agriculture, forestry, and changes in land use. One way to combat climate change is through agricultural mitigation.

## II. DEFINITIONS

1. **Agricultural production:** The term "agricultural production" describes the process of using adapted plants and animals to produce goods that strengthen or sustain human life. Agricultural output is measured in terms of volume and it is the crop's total yield from a farm, either seasonally or annually.

2. **Agricultural productivity:** Agriculture productivity is a crucial idea that not only explains the situation of the land and its yield but also aids in the formulation of policies. Agricultural land productivity refers to the output per unit of land. It not only describes the strength of the land but also the role of factors in increasing the productivity. Various production factors, such as the use of high-quality seeds, appropriate and high-quality fertilizers, and sources of irrigation, are involved in the production process. As a result, there are many factors which can affect the output per unit of land. It measures the outcome relative to the input. It makes hazy reference to the rate of output.

3. **Food security:** In 1986, the World Bank further elaborated on the activity level dimension and characterised food security as "secure access at all times to sufficient food for a healthy and active life". The concept of appropriate food is taken into account at the household and individual levels in both quantitative terms (i.e., caloric adequacy) and, even more so, in qualitative terms (i.e., variety, safety and cultural acceptability).

4. **Nutrition security:** The term "nutrition security" first arose in the early 1990s. It emphasizes on how food is consumed by a household or an individual as well as how that food is used by the body, so in concept it goes beyond food security. In terms of nutrition, the body's ability to absorb and process food is referred to as sufficient utilisation.

5. **Food and nutrition security:** "Food and nutrition security exists when all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life." - **FAO definition (1996, 2009)**

## III. GLOBAL AGRICULTURAL PRODUCTION TREND

2.9 percent in the 1960s, 2.1 percent in the 1980s, and 2.5 percent in the 2000s, respectively, the average yearly growth in agricultural production has declined. The majority of this rise occurred throughout the 1960s and 1970s as a result of increased input consumption per hectare, including labour, capital, and other inputs. Gains in Total Factor Productivity have allowed output to expand there has been a decrease in the growth rate of the use of certain input elements over the recent decades (TFP). Increases in TFP are largely to blame for the boom in worldwide agricultural productivity since the 1990s. This entails combining the various production elements more effectively through farming techniques (increasing technical efficiency) and introducing novel production-enhancing technology. The use of labor-saving techniques is responsible for a sizable portion of the TFP growth.

Agriculture output increased more quickly in countries with low and moderate incomes between 2001 and 2014 than in high-income nations. However, in low-income nations, higher input and land utilization rather than increases in productivity have been the main drivers of agricultural expansion. Even among those with low incomes, TFP growth outpaced using varying inputs per acre as a driver of agricultural expansion despite these substantial national disparities. Most future increases in global agricultural output are anticipated to come from expanding the use of already-existing or brand-new techniques and technology.

It can be seen from Table 1 that in the last fifty years cereals, pulses and oilseeds there has been an approximately three-fold rise in production, two times and eight times respectively. It is important to note that there are significant variances in how food grains are produced.

The production of cereals in 1961 was 876.8 million tons in which turned to 1192 million tons 1970 accounting a drastic change of 27%. During 1980 to 2017, its production was recorded to increase from 1549 to 2917 million tons. But it was declined to 2612 million

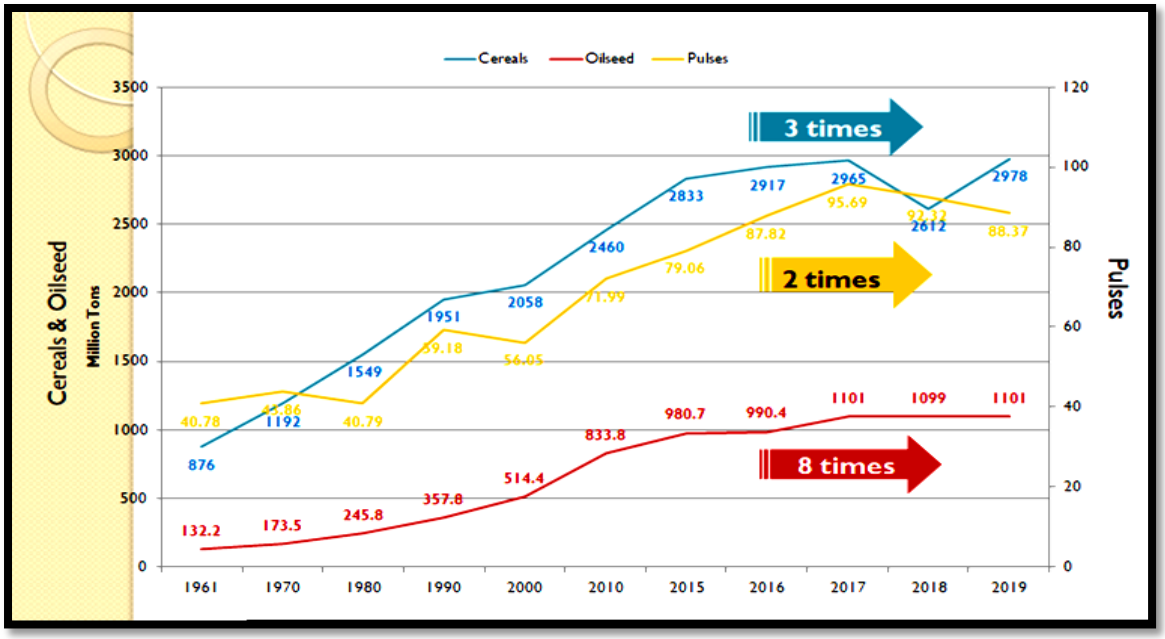
tons in the year of 2018 whereas it reached highest production of cereals in 2019 i.e. 2978 million tons.

**Table 1: Global Agricultural Production**

(Million tons)

| Years | Cereal | | Pulses | | Oilseeds | |
|---|---|---|---|---|---|---|
| | Production | % change | Production | % change | Production | % change |
| 1961 | 876.8 | | 40.78 | | 132.2 | |
| 1970 | 1192 | 27 | 43.86 | 7 | 173.5 | 24 |
| 1980 | 1549 | 23 | 40.79 | -8 | 245.8 | 29 |
| 1990 | 1951 | 21 | 59.18 | 31 | 357.8 | 31 |
| 2000 | 2058 | 5 | 56.05 | -6 | 514.4 | 30 |
| 2010 | 2460 | 16 | 71.99 | 22 | 833.8 | 38 |
| 2015 | 2833 | 13 | 79.06 | 9 | 980.7 | 15 |
| 2016 | 2917 | 3 | 87.82 | 10 | 990.4 | 1 |
| 2017 | 2965 | 2 | 95.69 | 8 | 1101 | 10 |
| 2018 | 2612 | -14 | 92.32 | -4 | 1099 | 0.1 |
| 2019 | 2978 | 12 | 88.37 | -4 | 1102 | 0.1 |

Source: Food and Agriculture Organization Corporate Statistical Database




Source: Food and Agriculture Organization Corporate Statistical Database

**Figure 1: Trends of Global Agricultural Production**

The production of pulses was registered at 40.78 million tons in 1961 which was increased to 87.82 million tons during 1970-2016. This crop witnessed very deep fluctuations in 1990 with 31% of change. Thus, production of pulses was recorded to be highest in the year of 2017 i.e. 95.69 million tons which declined to 92.32 in 2018 and 88.37 in 2019. The production of oilseed was 132.2 million tons in 1961 which was increased to 1102 million tons in 2019 showing its highest production. No deceleration was recorded in oilseed production since 1961 to 2019.

This data indicates that agricultural production (major crops) has increased considerably over the years but in terms of percentage, increase in production varies from year to year. During the same time frame, food and agriculture underwent a spectacular process of industrialization and globalization. The physical distance from farm to plate has expanded, lengthening food supply chains substantially; processed, packaged, and prepared food consumption has increased everywhere but the most remote rural villages. According to FAO, extensive hunger and malnutrition remain serious issues in many parts of the world. At the current rate of progress, hunger won't be totally eliminated by 2030 and most definitely not by 2050.

## IV. GLOBAL AGRICULTURAL PRODUCTIVITY TREND

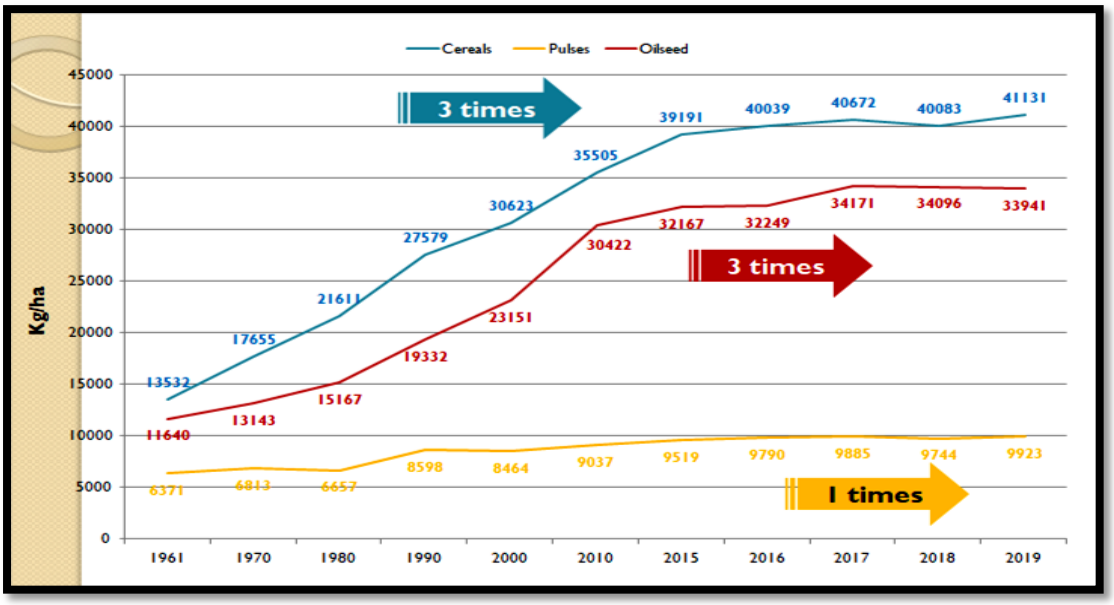
Growth in agricultural productivity has slowed recently. While the recent rate of population increase in the world is about 1.2 percent, the average yearly growth rate of productivity of the major agricultural crops is still quite low at about 1.3 percent. Land is a limited resource, making it impossible in many emerging nations to increase the area under cultivation (ECG, 2011). To fulfill the future need for food for the expanding population, increasing agricultural production may therefore be the only viable option. Owing to the unavailability of arable land and necessary inputs, intensive agricultural growth instead of extensive agricultural growth may be the new strategy to boost future agricultural productivity development across the majority of the world. Therefore, along with diversification, production intensification and improving input or resource usage efficiency are important critical initiatives.

**Table 2: Global Agricultural Productivity**

(Kg/ha)

| Year | Cereals | | Pulses | | Oilseed | |
|---|---|---|---|---|---|---|
| | Productivity | % change | Productivity | % change | Productivity | % change |
| 1961 | 13532 | | 6371 | | 11640 | |
| 1970 | 17655 | 23 | 6813 | 6 | 13143 | 11 |
| 1980 | 21611 | 18 | 6657 | -2 | 15167 | 13 |
| 1990 | 27579 | 22 | 8598 | 23 | 19332 | 22 |
| 2000 | 30623 | 10 | 8464 | -2 | 23151 | 16 |
| 2010 | 35505 | 14 | 9037 | 6 | 30422 | 24 |
| 2015 | 39191 | 9 | 9519 | 5 | 32167 | 5 |
| 2016 | 40039 | 2 | 9790 | 3 | 32249 | 0.2 |
| 2017 | 40672 | 2 | 9885 | 1 | 34171 | 6 |
| 2018 | 40083 | -1 | 9744 | -1 | 34096 | 0.2 |
| 2019 | 41131 | 3 | 9923 | 2 | 33941 | 0.4 |

Source: Food and Agriculture Organization Corporate Statistical Database




Source: Food and Agriculture Organization Corporate Statistical Database

**Figure 2: Trends of Global Agricultural Productivity**

The table 2 indicates that the per hectare productivity of cereals in 1961 was 13532 kg per hectare which in 1980 increased to 21611 kg and further 35505 kg per hectare in 2010. The per-hectare productivity of cereals was increased significantly to 41131 kg per hectare in 2019 recording its highest productivity till now. The productivity of cereals was increased by three times from 1961 to 2019.

For pulses, it was 6371 kg per hectare in 1961 increasing to 8464 kg per hectare in 2000. The per hectare productivity of pulses was recorded to be highest with 9923 kg in 2019. It was recorded that the productivity of pulses was increased by three times from 1961 to 2019.

In case of oilseed it rose to 34171 kg per hectare in 2017 against 11640 kg per hectare in 1961. The increase in productivity of oilseed was still very low i.e. it increased by one time only since 1961 to 2019.

1. **An overview of Indian agriculture:** For the years 2020–2021, the second advance estimates of agricultural production have been provided. A record production of 303.34 million tonnes of food grains is revealed by the second advance estimates of the production of key crops, which amply demonstrates the relentless labour of farmers, research by agricultural scientists, and farmer-friendly policies of the Central Government. Long-term gains for the nation will also come from comprehensive agriculture changes.

   The evaluation of production of various crops is based on data collected from States and verified with information from other sources in the 2nd Advance Estimates of Production of Principal Crops published by the Union Ministry of Agriculture and

Farmers' Welfare. The following major crops' expected production for 2020–21 is based on 2nd Advance Estimates:

**Table 3: Production of Major Crops during 2020-21(2nd Advance Estimates)**

| Sl. No. | Crops | Production (Million Tonnes) 2020-2021 |
|---|---|---|
| **1.** | **Foodgrains** | **303.34** |
| | Rice | 120.32 |
| | Wheat | 109.24 |
| | Nutri/ Coarse cereals | 49.36 |
| | Maize | 30.16 |
| **2.** | **Pulses** | **24.42** |
| | Tur | 3.88 |
| | Gram | 11.62 |
| **3.** | **Oilseeds** | **37.31** |
| | Groundnut | 37.31 |
| | Soybean | 13.71 |
| | Rapseed and Mustard | 10.43 |
| **4.** | **Sugarcane** | **397.66** |
| **5.** | **Cotton** | **36.54 million bales** |
| **6.** | **Jute & Mesta** | **9.78 million bales** |

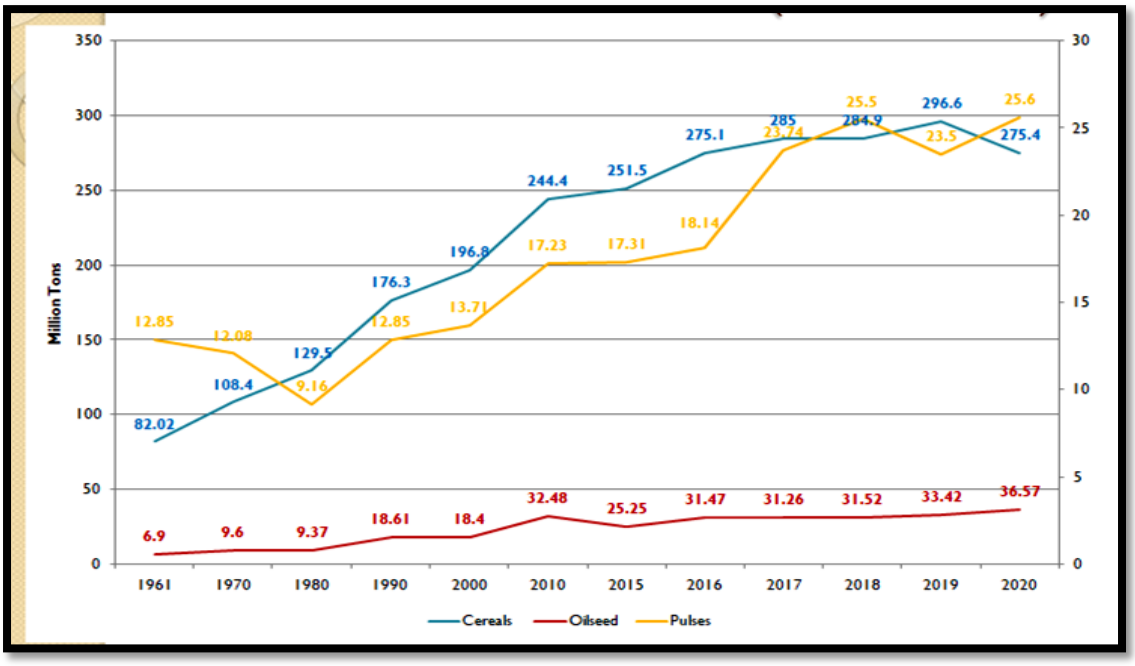
2. **Trends of agricultural production in India:** In India, the combined effects of a rise in total cultivated area and an increase in the average yield per hectare of the various crops have led to an increase in overall agricultural production. Table 3 reveals the trend in total agricultural production in India.

**Table 4: Agricultural production in India**

(Million tons)

| Year | Cereals | | Pulses | | Oilseeds | |
|---|---|---|---|---|---|---|
| | Production | % change | Production | % change | Production | % change |
| 1961 | 82.02 | | 12.85 | | 6.90 | |
| 1970 | 108.4 | 24 | 12.08 | -6 | 9.60 | 28 |
| 1980 | 129.5 | 16 | 9.16 | -31 | 9.37 | -2 |
| 1990 | 176.3 | 26 | 12.85 | 28 | 18.61 | 49 |
| 2000 | 196.8 | 10 | 13.71 | 6 | 18.40 | -1 |
| 2010 | 244.4 | 19 | 17.23 | 20 | 32.48 | 43 |
| 2015 | 251.5 | 2 | 17.31 | 0.4 | 25.25 | -28 |
| 2016 | 275.1 | 8 | 18.14 | 4 | 31.47 | 19 |
| 2017 | 285.0 | 3 | 23.74 | 23 | 31.26 | -0.6 |
| 2018 | 284.9 | -0.04 | 25.50 | 6 | 31.52 | 0.8 |
| 2019 | 296.6 | 3 | 23.51 | -8 | 33.42 | 5 |
| 2020 | 275.4 | -7 | 25.6 | 8 | 36.57 | 8 |

Source: Food and Agriculture Organization Corporate Statistical Database




Source: Food and Agriculture Organization Corporate Statistical Database

**Figure 3: Trends of Agricultural Production in India**

Agricultural production has grown. Additionally, this production raised the National Food Security Act's (NFSA) allotment of food grains, which climbed by 56 per cent in 2020–21 compared to 2019–20. Up till December 2020, the government will have distributed 943.53 lakh tonnes of food grains to the states and union territories.

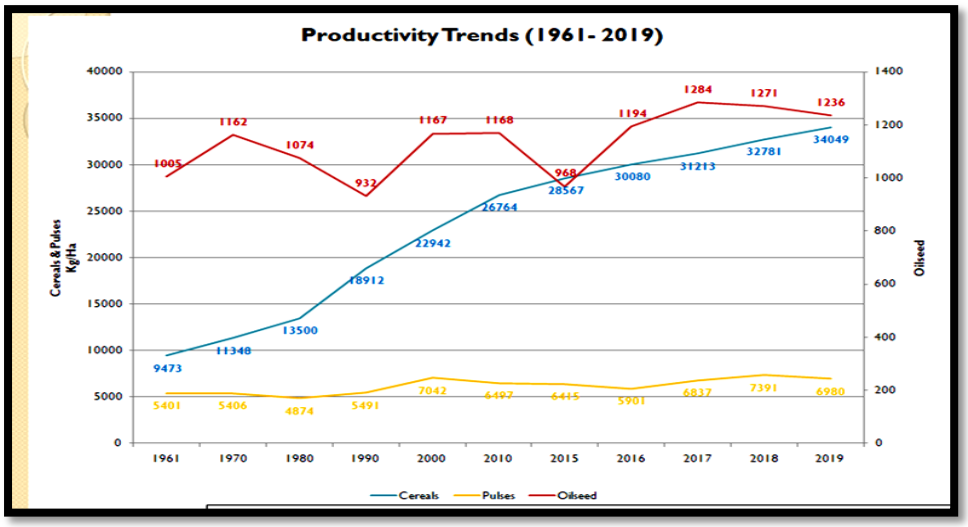
## 3. Agricultural productivity trends in India

**Table 5: Agricultural Productivity in India**

(Kg/ha)

| Year | Cereals | | Pulses | | Oilseed | |
|---|---|---|---|---|---|---|
| | Productivity | % change | Productivity | %change | Productivity | % change |
| 1961 | 9473 | | 5401 | | 1005 | |
| 1970 | 11348 | 16 | 5406 | 0.09 | 1162 | 13 |
| 1980 | 13500 | 15 | 4874 | -10 | 1074 | -8 |
| 1990 | 18912 | 28 | 5491 | 11 | 932 | -15 |
| 2000 | 22942 | 17 | 7042 | 22 | 1167 | 20 |
| 2010 | 26764 | 14 | 6497 | -8 | 1168 | 0.09 |
| 2015 | 28567 | 6 | 6415 | -1 | 968 | -20 |
| 2016 | 30080 | 5 | 5901 | -8 | 1194 | 18 |
| 2017 | 31213 | 3 | 6837 | 13 | 1284 | 7 |
| 2018 | 32781 | 4 | 7391 | 7 | 1271 | -1 |
| 2019 | 34049 | 3 | 6980 | -5 | 1236 | -2 |

Source: Food and Agriculture Organization Corporate Statistical Database




Source: Food and Agriculture Organization Corporate Statistical Database

**Figure 4: Trends of agricultural productivity in India**

Productivity growth is only increasing by about 2% annually. Limited land holdings, covert unemployment, poor incremental productivity, inadequate skill development, increased production costs, pricing hazards, and insufficient irrigation infrastructure sluggish land reform, ineffective provision of credit facilities, ineffective marketing of agricultural products and other factors are some of the causes of low productivity. Since India lacks landholdings suitable for agriculture, there is a need for considerable and widespread changes in agricultural methods.

**Some measures that can boost productivity include:**

- Enhancing the efficiency of irrigation systems
- Modernizing and introducing substantial irrigation
- Strengthen farm produce transportation and promotion
- Eliminate concerns with the APMC Act and other marketing-related challenges for farm products
- Enhancing the storage capacity, tenant safety, and seed supply with higher-quality seeds
- Encourage crop rotation and multiple cropping
- Encouragement of agricultural mechanization, which allows farmer to work independently of hired labour.

## V. STATUS OF FOOD AND NUTRITIONAL SECURITY

**A country's degree of food security needs to be evaluated on three different levels.**

1. The first is the sustainable availability of food at the national level, which influences the level and expansion of agricultural production or an adequate capacity for food imports.

2. Secondly it is the households' physical and financial availability to nutrition. For the food to be physically accessible and within reaching distance of populated areas or at a

suitable distance from them, an effective marketing, transport, and storage system is needed. The ability to afford food relies on its economic output and the cost of the food that is readily available.

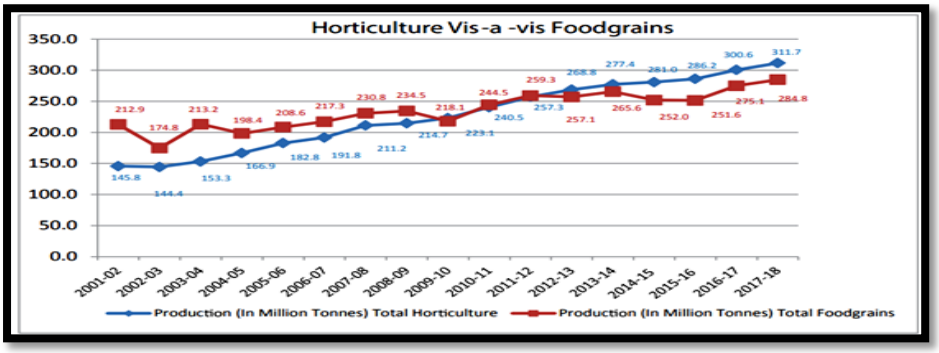
3. The final is how people use the food that is available to them, which focuses on how food is distributed within families and how everyone's health is kept at such a level that allows them to ingest and absorb the necessary amount of food. Food security is impacted at the individual level by social issues such as healthcare system, gender bias, and the role of women in household decisions.

## VI. CONCERNS VIS-A-VIS FOOD SECURITY IN INDIA

1. With 195 million undernourished people, India holds the highest number in the world.
2. India's agricultural output is incredibly low.
3. In India, 4 out of 10 children, or almost 47 million, are chronically undernourished or stunted, which prevents them from reaching its full potential.
4. The World Bank estimates that India's cereal productivity is 2,992 kg per hectare, while North America's productivity is 7,318.4 kg per hectare.
5. Fish, eggs, milk, and meat are replacing grains as the high-value agricultural commodities that make up the majority of the food crop. This pattern will persist as earnings increase, and India's indirect need for food from feed will increase quickly.
6. In 2018, India was positioned 76th out of 113 nations according to The Global Food Security Index (GFSI), which included four factors *i.e.* cost, availability, quality, and safety.
7. Out of 119 nations that qualified, India came in 103rd on the 2018 Global Hunger Index.
8. The FAO reports that 14.8% of the population in India is undernourished in its 2018 report, "The State of Food Security and Nutrition in the World."

- In addition, 51.4% of women between the ages of 15 and 49 are anaemic.
- Further the report states that weight of 21 percent of Indian children under the age of five are very less as compared to their height, and 38.4 percent of children under the age of five are undersized as compared to their age.

## VII. HORTICULTURAL CROP PRODUCTION

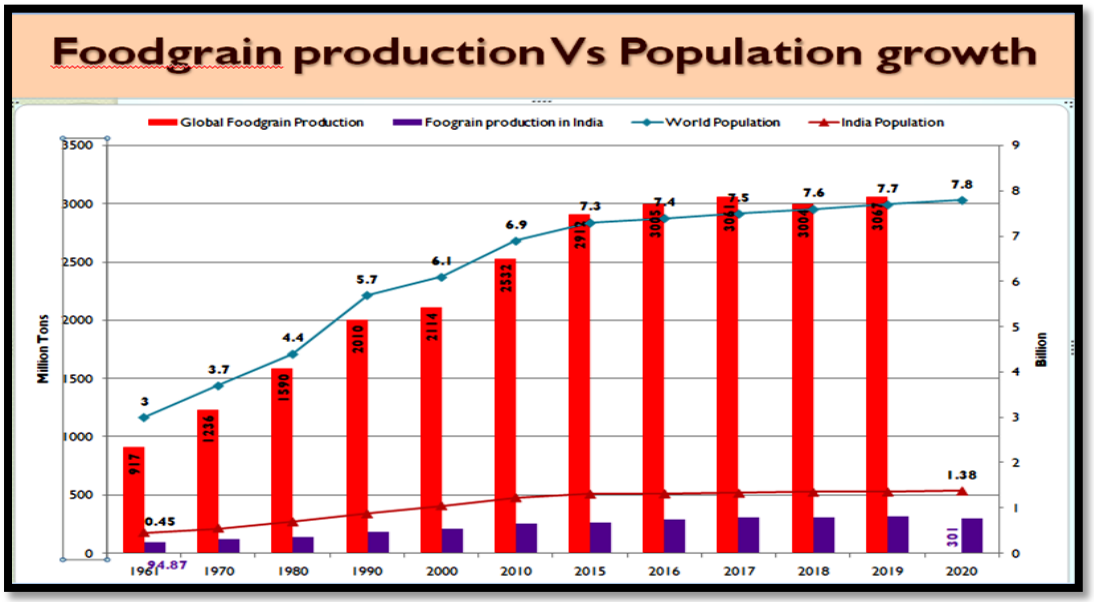



Source: Horticulture at a glance 2018

**Figure 5: Trends of Horticultural and Foodgrains Production**

Over the past five years i.e. from 2012-13 to 2017-18, India has seen a shift in agricultural acreage from food grains to horticulture crops. Since 2012–2013, the output of fruits and vegetables has overtaken that of food grains. Over the recent years, India has seen a surge in horticultural production. Area expansion has made huge progress, increasing productivity. The acreage under horticulture increased by 2.6 percent annually during the past decade, and average production rose by 4.8 percent annually. Horticulture crops were produced in 2017–18 on an area of 25.43 million hectares, producing 311.71 million tonnes. During 2004-05 and 2017-18, vegetable production climbed from 101.2 million tonnes to 184.40 million tonnes. Over same year, fruit production rose from 50.9 million tonnes to 97.35 million tonnes.

## VIII. FOODGRAIN PRODUCTION VS POPULATION GROWTH




Source: Food and Agriculture Organization Corporate Statistical Database

**Figure 6: Food Grain Production and Population Growth**

The world population during 1961 was 3 billion which was increased to 7.8 billion in 2020 while the foodgrain production was 917 million tons which was further increased to 3067 million tons in 2019.

The total population was 0.45 billion in 1961 and increased to 1.38 billion in 2020 while the foodgrain production was 94.87 million tons and 301 million tons in 1961 and 2019 respectively.

From the above trend of foodgrain production and population growth we can see that the total world population growth rate is 1.1% while production growth rate is 2.5%. So, 10.6% of total population is still in hungry state. The population growth rate of India is 1% while the production growth rate is 2.68%. Even though the foodgrain production growth rate is higher than the population growth rate, 13.8% of total population accounts for hungry people in India till 2020.

From the figure, it is shown that the total number of undernourished persons in 2005 was found to be 825.6 millions but it has been declined to 687.8 million in 2019. So, the percentage of undernourished people in the world was 12.6% in 2005 while it is 8.9% in 2019.

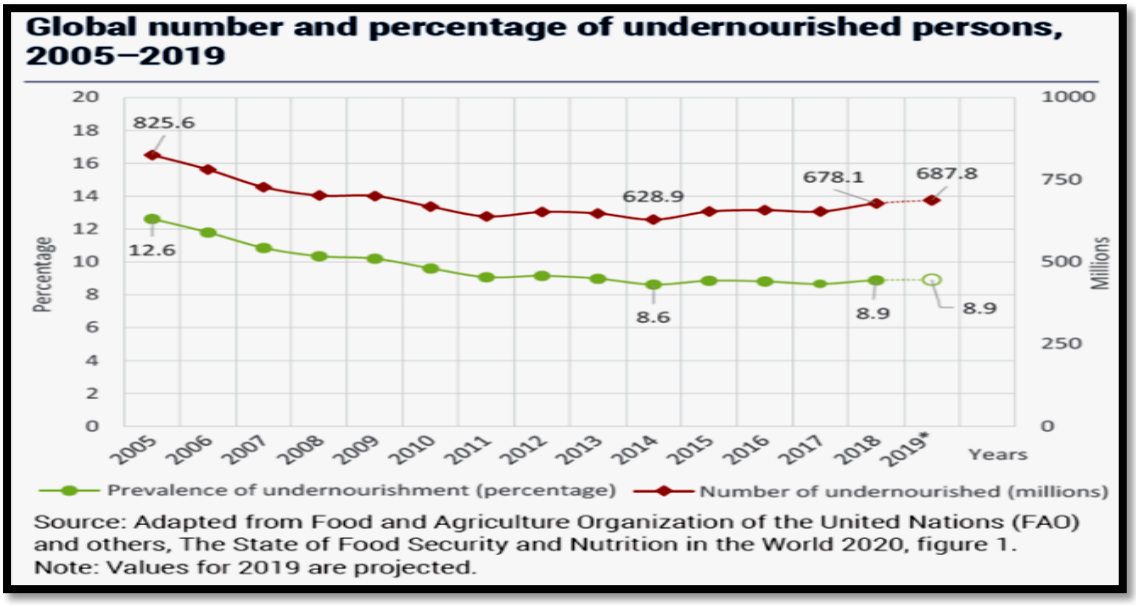



**Figure 7: Global number of percentage of undernourished persons**

## IX. ENSURING FOOD AND NUTRITION SECURITY

1. Given its enormous population, high rates of poverty, and widespread malnutrition, India faces a difficulty in ensuring food and nutrition security.
2. Depleting water supplies and the consequences of climate change are threatening food supply.
3. It is difficult for the 1/3–4/4 of the people that lives below the poverty line to access food economically.
4. Despite recent years of remarkable economic expansion, there has been little progress in improving food distribution and absorption.
5. About half of pregnant women and children are anaemic, and around 44 percent of children under the age of five are underweight.

## X. CHALLENGES TO FOOD SECURITY

1. **Climate change:** Farming is more challenging by rising temperatures and unpredictable rainfall. Change in climatic condition affects crops as well as animals, forests, fisheries, and aquaculture, and it has serious socio-economic repercussions such as decreased earnings, destroyed livelihoods, disruption of trade, and negative health effects.

2. **Limited access to rural areas:** The severe economic backwardness indigenous communities are a result of their subsistence farming practices and residence in remote, challenging terrain.

3. A rise in rural-to-urban migration, a sizable share of unorganized workers, and inadequate housing and food security have all contributed to the unplanned growth of slums.

4. Gender disparity, poverty, overpopulation, and lack of access to education.

5. Insufficient food delivery by governmental distribution channels like Public Distribution System (PDS).

6. **Biofuels:** As the market for biofuels has expanded, less land is now being used to cultivate food crops.

7. **Conflict:** Enemies may cut off food supply to gain an advantage by using them as a weapon. The battle may also result in the destruction of crops.

8. **Unmonitored nutrition programmes:** Although the country has several plans for programmes that include improving nutrition as their key component, these are not properly carried out.

9. Lack of intersectoral cooperation between several ministries as well as incoherent food and nutrition policies.

10. **Corruption:** Selling low-quality grains in ration shops, diverting grain supplies to the open market for a larger profit margin, and irregular store openings all contribute to the problem of food insecurity.

## XI. CONCLUSION

Maintaining food security for the nation's citizens as well as self-sufficiency in the production of foodgrains places a premium on productivity and growth in the foodgrain sector. Food grain output increases by 3.3 percent in the 1960s; between 1970–1971 and 1980–1981, it declined to 2.3 percent. The period from 1980–1981 to 1990–1991 was seen as the highest growth in food grain production, which increased by 3.8 percent annually. Due to population expansion, food loss and wastage, and exports, rice, wheat, and other grain production have expanded significantly, but their productivity has not kept up.

The level of productivity in the agricultural sector should be one of the primary priorities of food and nutritional security. Food is more readily available and easier to get as a result of increased agricultural output, especially in the food production sector. A sizable portion of households, particularly those in rural areas, may see their FS improve if domestic agriculture develops. The satisfaction of household food security and nutrition needs, the provision of employment possibilities, the increase in rural income levels (as a result of increased output and pricing), and the alleviation of rural poverty are some of the advantages associated with agricultural development. Urbanization and its negative consequences can be indirectly reduced by raising rural incomes in the agriculture sector.

For the purpose of enabling to feed the predicted growing global population, food and nutritional security is a fundamental challenge in global agriculture. The continuing increase in agricultural production and output can support meeting basic needs, battling starvation, lowering dependency on imports, encouraging economic sustainability, balancing the trade, and enhancing food and nutritional security. Most future increases in global agricultural output are anticipated to come from expanding the use of already-existing or brand-new techniques and technology.

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