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Performance of food security in India: A comparative analysis between UPA and NDA government regime

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Abstract

One of the prime concerns of India's policies has been the food and nutritional security to its population. The three important components of food security are: availability, access and absorption of food. These three are interrelated. The major aim of these study is to examine the performance of the food security in India in respect of these three components. In respect of availability, the average annual growth rate in Area under cultivation, Production and Yields of food grain have been computed for two political regimes. Namely, United Progressive Alliance (UPA) from May 2004 – May 2014 and National Democratic Alliance (NDA) from May 2014 – 2022 year. The food-grain production of 315.72 million tones was reported with an area of 130.53 million hectare in year 2021-22. Per capita net availability of food grains shows the positive trend with growth rate of 1.09 percent. Despite the adverse climatic condition prevalent during the major part of the NDA regime, Agricultural GDP grew at a healthy 3.46 percent in NDA regime compared to -3.65 percent recorded in the entire UPA regime. However, in the overall period Agriculture GDP was the 0.13 percent. The decline in the growth rate of undernourishment seen higher (-3.42 percent) in UPA regime while in NDA regime it was only -0.58 percent. BPL percent was decreasing in both the regime which shows the healthy economic growth of country. There was also a significant decline in the food deficit percent in UPA regime (-3.93 per cent) than the NDA regime (-1.11 percent). Food security is a fundamental inherent of the country that progresses food grain production, overcome malnutrition, improve agriculture GDP, overcome poverty line and hunger index score. The progress of food grain production because of farmers encouragement and supplying schemes to farmers. Further India's performance in food security on nutritional outcome has not been very satisfactory, it ranked 107th among 121 countries. The Global Food Security Index 2022 placed India in moderate category. It ranked India 68th among the 113 nation and cited affordability rather than availability as a key food security threat for Indians. It also points to its poor ability to move food efficiently because of infrastructure problem. We lived in a paradoxical time, and it is not the shortage of food but the lack of a proper food distribution network that is to blame.

Keywords: Food security, food grain production, GDP, undernourishment, global hunger index, food deficit

1. Introduction

Food security is the positive aspect of the world that aims to produce food for livelihood, mitigation of malnutrition, upliftment of nutrient intake with elevated population, mitigation of hidden hunger and improving share of agriculture GDP. The government of India initiated many food security schemes to provide food in villages, poor family, school, labors and pregnant women that is brought under essential commodity act, 1955. The government focused for thriving food security to improve food grain production with science and technology. The scientists, researcher, universities, institutes and directorates develop high yielding varieties (HYVs) for food security, and released many high yielding varieties and hybrids of agriculture and horticulture crops to food security. These high yielding varieties and hybrids of agriculture and horticulture crops were released for country to produce sufficient food.

The Food and Agriculture Organization (FAO) states that food security emerges 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. Food security has three important and closely related components, which are availability of food, access to food,

and absorption of food. The goal of the government is to make country self-sufficient in food grain production and provide enough grains to their population and to overcome undernourishment and abnormal health. Availability of food, National food security is critically depending on the adequate availability of sufficient food stocks to fully satisfy domestic demands at all times. This requirement can be ensured either through domestic food production or through imports. Accessibility of food, for individual's food security means that they have access to the required food either through their own production, through the market. And through the government transfer mechanism.

Food security is a vital aspect of any nation's development, particularly in a country as populous and diverse as India. With a population of over 1.3 billion people, ensuring food availability, accessibility, and affordability remains a significant challenge for the Indian government. Over the years, the country's political landscape has been dominated by two major political parties, namely the United Progressive Alliance (UPA) from 22 May 2004 to 26 May 2014 and the National Democratic Alliance (NDA) comes in government on 26 May 2014 to till the date, both of which have had their respective approaches towards addressing food security.

Objectives of study

1. To study the regime wise performance of food-grain production.
2. To study the regime wise performance of Gross Domestic Product (GDP)
3. To estimation of Year wise undernourishment, food deficit, poverty line and Global Hunger Index.
4. To estimate the demand and supply gaps of food grains in India.

2. Methodology: material and methods

The figure of Area under cultivation and total food-grain production are taken from the RBI annual report of various years. The figure of per cent share of GDP (constant price), undernourishment population per cent, poverty line per cent of population, global hunger index score, and food deficit kilocalorie per person per day compiled with different agricultural information sources. Including India, Ministry of Agriculture, (MoA), RBI annual report 2021, world bank,

FAO, UNICEF. The raw data collected from 2001 to 2022 years. The observation and data tabulated for the study.

2.1 Statistical analysis: For statistical analysis simple regression, standard deviation and coefficient of variation will use.

2.1.1 Analysis of growth rate in area and production

Compound growth rate was estimated to study the percentage increase or decrease in the selected parameter. The following exponential growth function used.

$$Y = a \cdot b^t$$

Where,

Y = Area, Production

a = Intercept

b = Regression coefficient

t = Time period (years)

$$CGR = [\text{Antilog}(\log b) - 1] \times 100$$

2.1.2 Measures of instability by Coefficient of variation in area and production

Coefficient of variation of area and production was calculated as a measure of stability by using following formula

$$C.V. \% = \frac{S.D.}{\text{Mean}} \times 100$$

2.1.3 Analysis of supply- demand gap

Supply-demand gap = Total food grain production - Total food-grain demand

2.1.4 Projection of demand and supply of food grains

$$\text{Log } Y = \log a + t \log b$$

Where,

a = intercept

t = time period in years

b = regression coefficient

3. Results and Discussions

3.1. Analysis of variation in food security

Table 1: Coefficient of variation of various indicators

Sr. No.	Particular		UPA (Regime I)	NDA (Regime II)	Overall
	Duration		22 May 2004 to 26 May 2014	27 May 2014 to 2022	22 May 2004 to 2022
1.	Area under cultivation (million hectare)	Mean	124.84	123.08	127.04
		Min	120.08	120.08	123.22
		Max	130.53	126.67	130.53
		CV	2.47	1.72	2.14
2.	Total food grain production (Million tonnes)	Mean	255.91	233.356	284.10
		Min	198.36	198.36	251.57
		Max	315.72	265.04	315.72
		CV	13.47	9.79	8.47
3.	Yield (kg/ha)	Mean	2045	1894.7	2234.37
		Min	1652	1652	2028
		Max	2419	2129	2419
		CV	11.49	8.99	6.87
4.	Per cent Share of agricultural GDP	Mean	16.27	15.87	16.78
		Min	13.94	13.94	14.89
		Max	20.31	19.03	20.31
		CV	11.42	11.82	10.89
5.	Undernourishment %	Mean	17.28	19	15.14
		Min	14.37	17	14.37
		Max	23	23	16.3

		CV	14.92	11.63	4.44
6	BPL per cent	Mean	25.61	27.07	23.8
		Min	13.4	21.9	13.4
		Max	37.5	37.5	29.8
		CV	20.74	17.48	24.11
7	GHI (Global Hunger Index)	Mean	26.29	24.01	29.13
		Min	17.8	21.2	17.8
		Max	38.2	32.2	38.2
		CV	18.93	13.02	19.07
8	Food Deficit	Mean	119.22	129.2	106.75
		Min	103	110	103
		Max	152	152	110
		CV	14.25	13.16	2.86
9.	Per capita availability of food	Mean	172.02	165.21	180.55
		Min	154.2	154.2	169.8
		Max	187.8	179.5	187.8
		CV	6.13	5.02	3.14

As seen from the table 1, the coefficient of variation of area for overall period was 2.14 per cent while the production increased by the 8.47 per cent due to use of heavy fertilizer and high yielding varieties. The productivity is also increasing by the 8.67 per cent. Per cent share of agricultural GDP to total GDP is showing the variation of 10.89 percent. Whereas undernourishment population, population below poverty line, Global Hunger Index score (GHI) and Food deficit shows the variation of 4.44 percent, 24.11 per cent, 19.07 per cent and 2.86 per cent respectively.

In the first period of United Progressive Alliance (UPA) era, the coefficient of variation of area for period 2004 to 2014 was 2.47 per cent and total food grain production increased by 13.47 per cent. The variation in productivity shows the 11.49 per cent and coefficient of variation of per cent share of agricultural GDP in total GDP is 11.42 per cent. Whereas the per cent of population undernourishment, Population below

poverty line, Global Hunger Index (GHI) score and food deficit shows the coefficient of variation of 14.92 per cent, 20.74 per cent, 18.93 per cent and 14.25 per cent respectively. In the second period of the study which is National Democratic Alliance (NDA), era, the coefficient of variation of from period 2014 to 2022. The variation in area, total food grain production and yield was observed as 1.72 per cent, 9.79 per cent and 8.99 per cent respectively. The coefficient of per cent of agricultural GDP in total GDP was observed as 11.82 per cent. Whereas the variation observed in the undernourishment population, Below poverty line percent of population, Global Hunger Index (GHI) score and food deficit observed as 11.63 per cent, 17.48 per cent, 13.02 per cent and 13.16 per cent respectively.

3.2. Analysis of Compound Growth Rate of food grain production

Table 2: Compound growth rate

Sr. No.	Particulars	UPA (Regime I)	NDA (Regime II)	Overall
1	Area under cultivation (million hectare)	0.247958	0.630881	0.358008
2	Total food grain production (million tonnes)	3.112325	3.474478	2.482599
3	Yield (kg/ha)	2.85908	2.826909	2.11791
4	GDP per cent	-3.65109	3.461737	0.132775
5	Undernourishment	-3.42136	-0.58234	-2.44356
6	BPL per cent	-1.29089	-1.10349	-1.50347
7	GHI	0.489026	4.175404	1.957066
8	Food deficit	-3.93979	-1.11112	-2.26945
9	Per capita food grain availability	1.436509	1.233269	1.093685

The compound growth rates for various agricultural indicators provide valuable insights into the trends and patterns of the agricultural sector. Analysis the compound growth rates for the area under cultivation, total food-grain production, yield, and per capita food grain availability. To see the availability of food-grain in country. The area under cultivation has experienced a compound growth rate of 0.35 per cent over the specified time period. This indicates a relatively slow increase in the cultivated land area. It shows very less increment in the area under cultivation in both UPA and NDA regime, with 0.24 per cent and 0.63 per cent respectively.

The compound growth rate of total food-grain production has been 2.48 per cent. This indicates a significant growth in overall food-grain output over the analyzed period. 3.11 per cent growth in UPA regime and 3.47 per cent growth in NDA regime. A higher growth rate in food-grain production implies increased agricultural productivity, adoption of improved farming techniques, use of high-yielding crop varieties, and

enhanced agricultural infrastructure. This positive trend suggests that efforts to boost agricultural production have been successful.

The compound growth rate of yield reflects a positive growth trend of 2.11 per cent overall period. It shows the uniform growth rate of 2.85 per cent in both the regime. This indicates that farmers have been able to produce more food-grains per unit of land. Higher yield growth signifies advancements in agricultural practices, including better irrigation systems, improved fertilization methods, effective pest and disease management, and increased mechanization.

The compound growth rate of per capita food-grain availability has increased by 1.09 per cent overall period. This growth rate indicates a moderate improvement in the availability of food grains on an individual basis. UPA and NDA regime share the similar growth rate of 1.43 per cent and 1.23 per cent.

The CAGR of the share of agriculture GDP to total GDP has been 0.13 per cent. This indicates a relatively slow increase in the contribution of the agriculture sector to the overall economy. In the UPA regime, the CAGR of agricultural GDP shows negative growth of - 3.65 per cent. On the contrary, in the NDA regime it shows the positive growth of 3.46 percent. It suggests that the agriculture sector's growth rate has been modest compared to other sectors, such as industry and services.

The percentage of Below Poverty Line (BPL) population shows the declining trend in the overall regime with -1.50 per cent. BPL refers to individuals or households living below a certain income threshold and facing significant socio-economic challenges. Higher BPL percentages indicate a larger portion of the population struggling with poverty and limited access to sufficient and nutritious food.

This negative growth rate of undernourishment, that is -2.44 per cent indicates a significant reduction in the proportion of the population experiencing undernourishment over the period. There were a sharp decline in the UPA regime (-3.42 per cent), while there is very little improvement in the NDA regime (-0.58 per cent). It suggests that positive progress towards achieving food security goals in India.

The GHI increased by the 1.95 per cent in overall regime. The analysis shows that there is a stiff rise in GHI in the NDA regime with CAGR of 4.17 per cent and very little rise in the UPA regime, that is 0.48 per cent.

The CAGR of food deficit in India is -2.26%. This negative growth rate indicates a consistent decrease in the food deficit over the specified period. A declining food deficit implies that India has been able to bridge the gap between food demand and supply, ensuring a more stable and adequate availability of food. It suggests improvements in agricultural production, supply chain management, and food distribution systems. This trend reflects positive strides towards enhancing food security and reducing dependency on external sources for food.

3.2.1. Estimation of Year wise Area under cultivation

Every year variable production was recorded with an difference in areas. The range of production areas 120.08 to 130.53 million hectares during the entire UPA and NDA regime. It is revealed that in the case of first period of study, that is UPA regime highest area observed in the year 2010-11 i.e. 126.67 million hectares. Then in the NDA regime highest area was observed in the year 2021-22 i.e. 130.53 million hectares. Thus higher growth rate was observed in the NDA regime with the growth rate of 0.63 per cent.

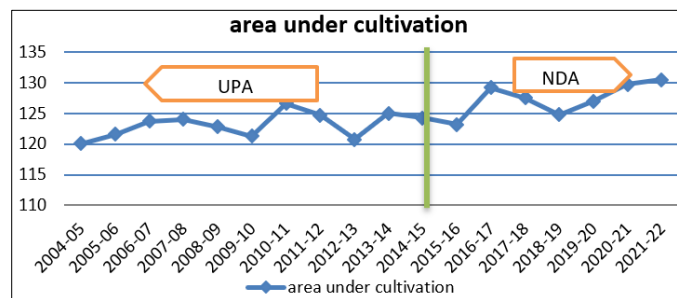


Fig 1: Area under cultivation of food-grains in India

3.2.2. Estimation of year wise food grain production and productivity

Figure 2 and 3 present the growth rate of yield and production of total food grains in India during the entire UPA and NDA

regime. It is revealed that in the case of production of food grains the growth rate is similar in both the regime. 3.11 per cent in UPA regime and 3.47 per cent in NDA regime. Same is observed in the yield of food grains in overall period of two governments. Higher production observed in the NDA regime was caused by an improvement in both area and yield. The good food grain production are because of proper application of agriculture inputs, encouraging farmers by central and state government, providing subsidy in agriculture input to farmers, offering benefit of schemes to farmers, and providing trainings to farmers for crop production.

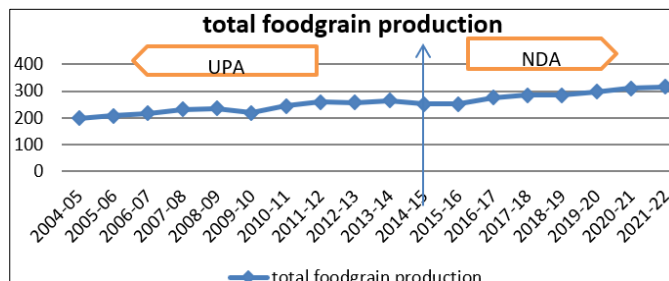


Fig 2: Total food-grain production (Million tones)

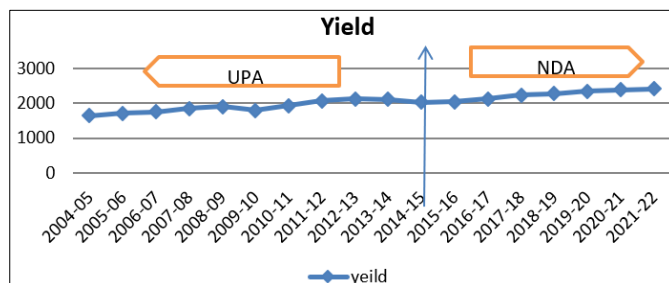


Fig 3: Yield of food grains in India (kg/ ha)

3.2.3. Per capita net availability of food grain

The above findings reveals that, in terms of per capita availability of food grains in India, the performance of UPA and NDA regime was mixed. The growth of per capita availability of food grain in entire period was observed 1.09 per cent.

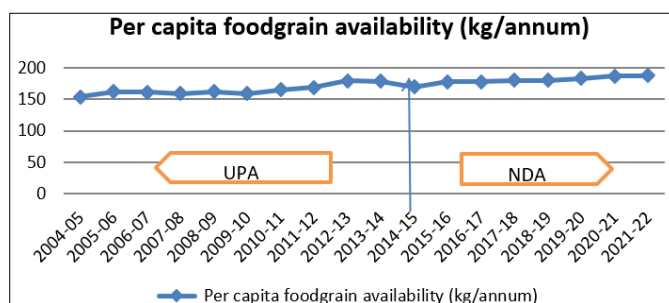


Fig 4: Per capita availability of food grains in India (kg/ annum)

3.2.4. Estimation of year wise agriculture gross domestic product

On an average, per cent share of agricultural Gross Domestic Product (GDP) in total GDP (Base: 2004-05) recorded a compound annual growth rate (CAGR) of 0.13 per cent during the overall regime. It is observed that, the GDP in agriculture sector in UPA regime shows the negative growth of -3.65 per cent. In contrast, in the NDA regime, agricultural GDP shows the positive growth rate of 3.46 per cent. However, the NDA regime shows the highest agricultural growth.

In this context, it is to be noted that the first two years (2014 and 2015) of the NDA regime has witnessed drought followed by below normal monsoon and devastating floods in parts of India in year 2017 and 2018 respectively. In the contrast in the ten years of the UPA regime, only two years (2009 and 2012) experienced drought condition. (NRAA, 2013; Ray et al. 2015). Thus, except 2016, all the other years under the NDA regime experienced climate induced agrarian risk. Despite this the agriculture sector has growth at the targeted rate of 4 per cent. Though all the drought years in the past have witnessed a lower agricultural growth, the sector grew at higher rate during second five years of NDA regime.

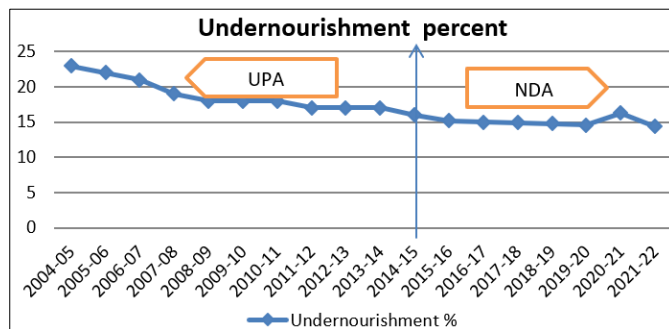


Fig 7: Percent of undernourishment population in India

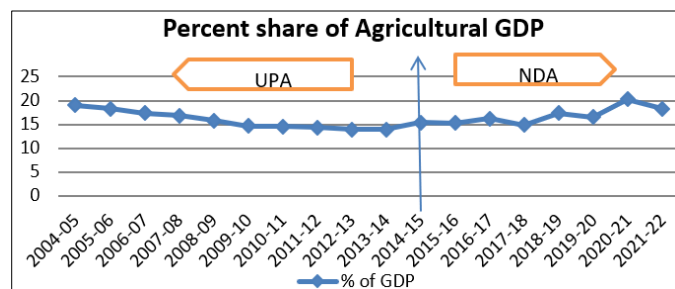


Fig 5: Per cent share of Agriculture GDP in total GDP

3.2.5. Estimation of year wise poverty line per cent of population

As a percentage of below poverty line (BPL) population to total population shows the constant negative growth rate through entire study period. In the UPA regime the growth rate observed as -1.29 per cent and in NDA regime growth rate observed as -1.10 per cent. The overall growth rate was -1.50 per cent.

Data shows the fluctuation in the poverty line due to changes in daily wages of people with government scheme, increase in per capita income of people, improvement in standard of living, and establishment of macro and micro scale business unit. Decrease in the poverty shows the economic betterment of the population. It shows the affordability of the people for their needs.

3.2.7. Estimation of year wise Global Hunger Index

India ranked 107th out of 121 countries in the Global Hunger Index (GHI) 2022, down from the 101st position the previous year. The GHI value is determined through GHI severity scale. The GHI severity scale is prepared by UN agencies such as FAO, UNICEF, WHO and World Bank. The GHI value 38.2 observed in year 2017-18, which is the highest value. The growth rate of GHI was observed highest in NDA regime, that is 4.17 per cent. In contrast, the growth rate of GHI in UPA regime was 0.48 per cent. The hunger problem in India is because of lack of awareness of food nutrition department, people get the one meal per day due low wage rates. The department of food and health does not provide food nutrition Programme regular in remote rural region.

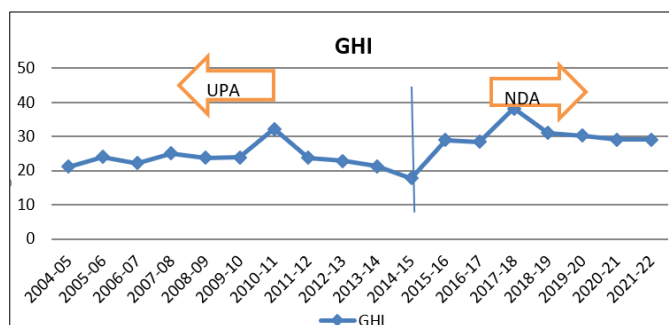


Fig 8: Global Hunger Index score in India

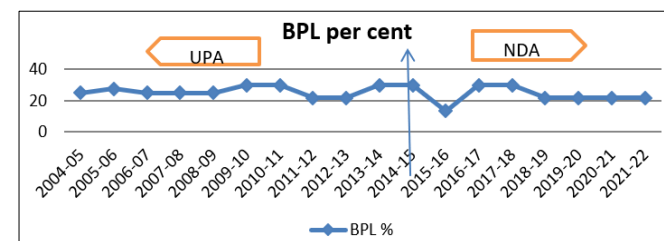


Fig 6: per cent of population Below Poverty Line

3.2.6. Estimation of year wise undernourishment per cent of population

The CAGR of undernourishment percent declined significantly during the UPA regime. First four years shows the sharp decline in undernourishment percent of population. The UPA regime shows the negative CAGR of -3.42 per cent, while in the NDA regime it shows the negative CAGR of -0.58 per cent.

Lowest undernourishment found because of achieving benefits under the National food security schemes, attaining complete diet from ration shop, improving rural facilities and increase in food grain production and allied sectors.

3.2.8. Estimation of year wise food deficit

Depth of hunger (intensity of food deprivation); the intensity of food deprivation indicates how much food-deprived people falls short of minimum food needs in terms of dietary energy. It is measured as a difference between the minimum dietary energy and the average dietary energy intake of the undernourished population (food deprived).

These findings reveal that, during the UPA regime there is a sharp decline in the growth rate i.e. -3.93 per cent while in the NDA regime there were no sign of decline. It shows the negative growth rate -1.11 per cent. While overall CAGR for food deficit observed -2.26 per cent.

The intensity of food deprivation is low when it is less than 200 kilocalories per person per day and high when it is higher than 300 kilocalories per person per day. The greater the food deficit, the greater the susceptibility for health risk related to undernutrition.

The daily wages of worker are low in India. The public servant is not provided benefit of government nutrition scheme to rural population. The improper distribution of meal from ration shop. The limited micro and macro scale industries that provide employment to people. The bank is not sanctioned loan to extremely poor and poor people for establishing business. The government has very less attention towards poor people. The government should establish food

rehabilitation center in every state and district with low price meal. So that poor people will get the food at low price.

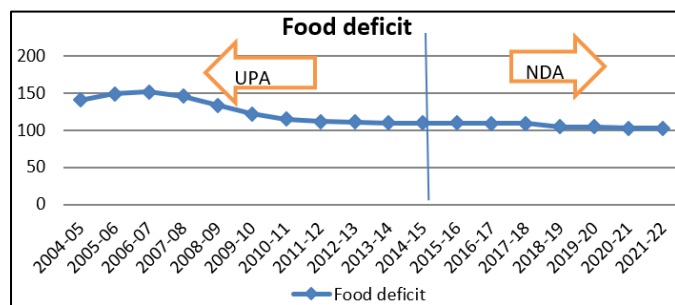


Fig 9: Food deficit (kilocalories per person per day)

3.3. Analysis of supply – demand gap

When food-grain production exceeds the total food-grain demand, it suggests a supply-demand gap in favor of the food supply. An excess production of food-grains indicates that the supply of food grain is more than the immediate demand. This is generally seen as a positive sign for food security, as it ensures that there is a sufficient quantity of food available to meet the population's needs.

Excess food grain production can create opportunities for export, contributing to economic growth and foreign exchange earnings for the country. Exporting surplus food can help improve the overall trade balance and promote agricultural development. However, it is important to ensure that domestic food security needs are prioritized before considering significant export quantities.

Table 3: Supply demand gap (Million tonnes)

Sr. no.	Year	Supply	Demand	Gap
1	2004-05	198.36	166.83	31.53
2	2009-10	230.31	195.86	34.45
3	2012-13	264.79	206.38	58.41
4	2015-16	267.99	213.81	54.18
5	2017-18	274.55	219.77	54.78
6.	2019-20	281.12	227.35	53.77

(Source: Ray and Banjul)

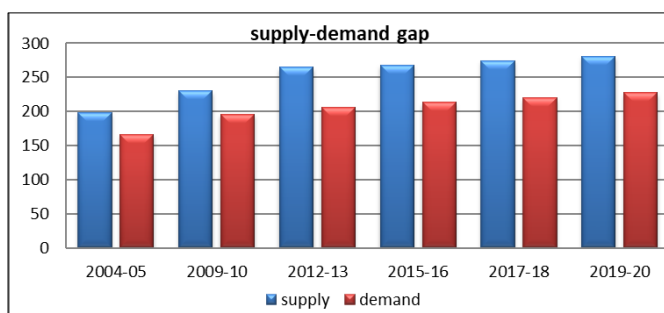


Fig 10: household supply - demand comparison

3.4. Projection of demand and supply of food grains

From the above table it is revealed that the projection of total food grain production for the year 2025-26 and 2030-31 is 344.71 and 389.68 million tonnes respectively. The area under cultivation will be increased in 2030-31 i.e. 132.60 million hectares. Yield will increase in 2025-26 and 2030-31 year by 2641.58 and 2933.41 (kg/ha). The per cent share of agriculture GDP in total GDP will remain constant for two periods. In the year 2025-26 and 2030-31, the per cent of undernourished people will continue goes down from 12.56 per cent to 11.10 per cent. Per cent of BPL population shows a decreasing trend from 20.73 per cent to 19.22 per cent from

2025-26 to 2030-31 per cent. In the year 2025-26 and 2030-31 the food deficit person shows decline from 88.68 to 79.06 kilocalories per person per day. The per capita food grain availability will increase from 196.73 to 207.72 kg per annum.

Table 3: Projection of demand and supply of food grains

Sr. No.	Particulars	2025-26	2030-31
1	Area under cultivation (million hectare)	130.30	132.60
2	Total food grain production (million tonnes)	344.71	389.68
3	Yield (kg/ha)	2641.58	2933.41
4	Per cent share of agriculture GDP	16.45	16.56
5	Undernourishment	12.56	11.10
6	BPL per cent	20.73	19.22
7	(Global Hunger Index) GHI	32.94	36.30
8	Food deficit (Kilocalories per person per day)	88.68	79.06
9	Per capita food grain availability (kg/annum)	196.73	207.72

4. Conclusion

The performance of UPA and NDA regime was nearly equal in terms of the growth of the total food-grain production. UPA regime (3.11 per cent) and NDA regime (3.47 per cent). During the overall period, significant productivity growth was achieved in the cultivation of total food-grains. the growth in productivity was observed at 2.11 per cent over the entire period. The slow growth rate of per capita food-grain availability was observed in both the political regime with overall growth of 1.09 percent. Despite the adverse climatic condition prevalent during the major part of the NDA regime, Agricultural GDP grew at a healthy 3.46 per cent in NDA regime compared to -3.65 per cent recorded in the entire UPA regime. However, in the overall period Agriculture GDP was the 0.13 per cent. The decline in the growth rate of undernourishment seen higher (-3.42 per cent) in UPA regime while in NDA regime it was only -0.58 per cent. BPL per cent was decreasing in both the regime which shows the healthy economic growth of country. There was also a significant decline in the food deficit per cent in UPA regime (-3.93 percent) than the NDA regime (--1.11 percent). The projection of food grains production in the year 2025-26 and 2030-31 shows the shows the increasing trend 344.71 to 389.68 million tonnes and the per capita food grain availability will also increase from 196.73 to 207.72 kg per annum in the projected year. Food security is a fundamental inherent of the country that progresses food grain production, overcome malnutrition, improve agriculture GDP, overcome poverty line and hunger index score. The progress of food grain production because of farmers encouragement and supplying schemes to farmers. Thus from the point of view of developing India's food security through the important policy instrument namely public expenditure, the role of central government has diminished after the recent reforms introduced in the center - state transfer mechanism. Policy makers give equal or more attention to the role of state government in promoting agriculture growth and farmers welfare.

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