



## A Review on the Determinants and Challenges of Food Security in Selected States of India

Jareaa. L<sup>1</sup>, Joshi. M<sup>2</sup>

<sup>1</sup> Research Scholar, Faculty of Management Studies, Marwadi University, Rajkot, Gujarat.

<sup>2</sup> Associate Professor, Faculty of Management Studies, Marwadi University, Rajkot, Gujarat

E-mail: <sup>1</sup>Lubna.jareaa@gmaila.com, <sup>2</sup>Meeta.joshi@marwadieducation.edu.in

---

---

### Abstract

#### a) Introduction

The study introduces a brief description of food security in India and specifically, three states of the country; Madhya Pradesh, Rajasthan and Gujarat. The concept of food security refers to the availability of adequate food to all the population. Four dimensions of food security are availability, accessibility, stability and utilisation. In this article, these dimensions are explored in light of available data and challenges of food security are further reviewed.

#### b) Study objects and methods

Relevant secondary data were used for the purpose of this article. These include; official statistics, published articles, and governmental reports. This was complemented by a review on the main challenges of food security in the three states of India.

#### c) Results and discussion

It is identified that huge population growth, high poverty levels, and inadequate agricultural production are major challenges for Gujarat, Rajasthan and Madhya Pradesh with regard to food security. Availability of food is a main pillar of food security. Therefore, agriculture is the pathway for improving the status of food security through improved production. As it is susceptible to many factors, including weather variabilities, introducing developments to the sector can play a major role in improving food security. Modern technologies, implementing governmental schemes and policies can enhance the opportunities for better food security.

#### d) Conclusion

Most of the employment of India is based on agriculture because agriculture is one of the biggest sectors of the country but food insecurity is still increasing. Higher population growth and poverty are the major reasons for food insecurity in the country.

Keywords: Food security, challenges, determinants, population growth, poverty

---

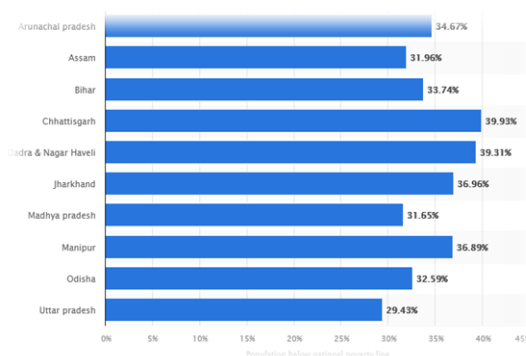
---

### 1. Introduction

#### a) Problem statement

It is identified that the poverty level of India is increasing day by day and that is negatively impacting food security in the country. **About 71%** of the Indian population are unable to have adequate healthy food and **nearly 1.7 million** Indian populations are dying every year due to diseases associated with malnutrition [1]. The figure below represents the percentage of population living under the national poverty level in different states of India. It can be identified that Chhattisgarh, Dadra and Arunachal Pradesh have the highest percentage of population who live under the national poverty line [2]. Poverty is associated with

inaccessibility to food, and it is directly affecting food security of the population. Adding to this, the population of India is constantly growing along with food requirements. This puts too much pressure on the agricultural sector which is required to produce enough food to fulfil the needs of the huge population which is a main concern regarding food security in India.



**Figure 1:** Increasing poverty line in different states of India

(Source: [2])

### b) Research objectives

Research objectives of the study are,

- To identify the main determinants of food security in India
- To evaluate the challenges and opportunities regarding food security in selected states; Gujarat, Madhya Pradesh, and Rajasthan
- To understand the connection between agriculture production and trends and the status of food security in India

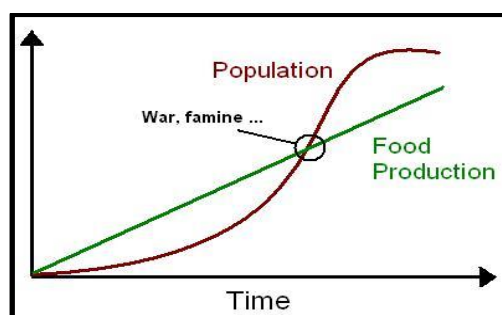
## 2. STUDY OBJECTS AND METHODS

### a) Methods

The researcher has used different methods and processes for the collection of relevant data regarding food security in India. Primary sources such as surveys and interviews are used for gathering some genuine and numerical data. On the other hand, *secondary sources* are used for collecting some objective and numerical data from previously published *articles, journals and reports* [3]. Thereafter, the researcher has used Microsoft Excel as a tool for creating mathematical equations in order to properly analyse the collected data. All the collected numerical data are analysed tables as well as mathematical equations helps to understand the level of food security in India and its association with agricultural production.

### b) Theoretical perspective

*Neo-Malthusian theory* is a significant theory that is concerned about food security and explores the significant impact of population increment on food security [4]. It can be identified in the figure below that the ratio of food production remains the same as the population ratio is increasing. Along with population growth, it is important to increase food production to enable availability of adequate food for all the population. This particular theory helps to understand the impact of increasing population in the three states on the food security.

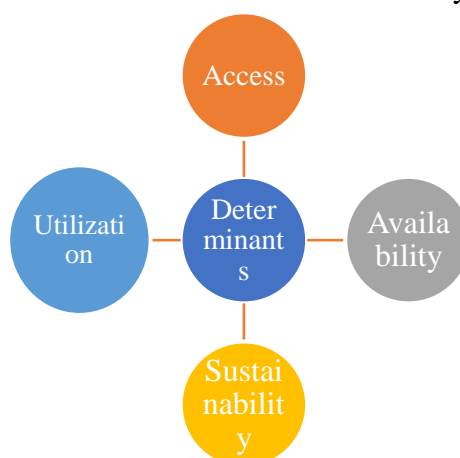


**Figure 2:** Neo-Malthusian theory  
(Source: [4])

### c) Review of studies

#### Main determinants of food security

Determinants of food security refer to the dimensions that help to identify the level of food security. The main determinants of food security are **food availability, accessibility, , stability and utilisation** [5]. Proper access and availability of healthy food to all the population of a country indicates a good status of food security. Availability and accessibility are the major determinants of food security; stability, or sustainability as it can be referred to, is another significant determinant of food security. stability in terms of individual or household's capacity to have adequate, safe, and healthy food for the longer term is an important determinant that is also associated with agriculture [6]. Utilization is more related to the quality of the food consumed and its nutritional value; it is also associated with the ability of individuals to process and benefit from nutrients in the food they consume.



**Figure 3:** Main determinants of food security  
(Source: Learner)

#### Food security challenges in Gujarat

Gujarat is one of the most significant states of India in which about 40 crops are grown in different seasons including millet, bajra, cumin, vegetables, sugarcane, and wheat among others. It is identified that Gujaat is experiencing a high level of food insecurity with the **level of 0.621-0.776** [7]. It is well known that the population of the state is constantly increasing along with poverty levels and uncertainties which are major challenges for food security in the state. According to the International Food Policy Research Institute, the level indicates that most of the population of Gujarat are suffering from unavailability of adequate food.

Crops	Production (million tonnes)
Groundnut	4.64
Total Oilseeds	6.66
Cotton	8.28
Wheat	4.80
Millet	17.96
Bajra	10.86

**Table 1:** Production of different crops in Gujarat (year) (source)

It can be identified that the growth of the population in Gujarat is not matched by the agricultural production in the state. It was estimated that the population of Gujarat will be **70.7 million** in 2020 and by the March of this year the population turned into **70.6 million** [8]. The huge growth of population in Gujarat can be noticed which leads to lower cultivation fields and because of that the cultivated crops are not enough to complete the requirement of the people. The table above represents the values of production of different crops. Groundnut is produced **about 4.64 million tonnes**, oilseeds are produced **about 6.66 million tonnes** and cotton is produced **about 8.28 million tonnes** in a year (refer to excel). Apart from that, **4.80 million tonnes** wheat is produced, **17.96 million tonnes** millet produced and **10.86 million tonnes** bajra are produced in Gujarat [9].

Due to huge population growth this profusion of crops is not enough to complete the needs of people in Gujarat. Apart from that, uncertainties such as COVID-19 pandemic have highly impactful effects on the economic condition of these states. It is identified that **about 25%** of the population of Gujarat were living in poverty in 2018 and that increased to **33% in 2021** [10]. The high increase in poverty can be considered as the impact on the pandemic crisis which made people unable to buy adequate food. The government of the state must be concerned about the population growth and there must be some legislation in order to prevent the huge growth of population. In addition to that, using modern technologies helps to produce more crops in less time. Therefore, usage of advanced technologies in agriculture will be an opportunity for the state regarding food security.

#### **Food security challenges in Madhya Pradesh**

Population growth, increasing poverty level and not enough cultivation are the major challenges for Madhya Pradesh regarding food security. Increasing poverty due to several uncertainties is the major reason for food insecurity in Madhya Pradesh. It is identified that **about 36.65%** which is one third of the population of Madhya Pradesh are living under the national poverty line and that is the reason for unavailability of food for them [11]. Due to high poverty, people in the state are unable to buy food products and that leads to food insecurity. The COVID-19 pandemic crisis has majorly impacted economic stability of all the countries in the world and the economic condition of Madhya Pradesh is highly impacted by

the crisis. Wheat, mustard, linseed, peas, lentils and other crops are cultivated in Madhya Pradesh which is the *second largest state* in India.

Crops	Production (million tonnes)
Wheat	19.61
Coarse Cereals	4.82
Total Pulses	3.8
Total Food grains	33.03
Soyabean	5.15
Total Oilseeds	6.57

**Table 2:** Production of different crops in Madhya Pradesh

(Source: Learner)

Apart from that, the population of Madhya Pradesh is also increasing and due to that percentage of fields for cultivation is also decreasing. It was estimated that the population might be *85.6 million* of Madhya Pradesh at the end of 2022 but by the month of March of the year the population of Madhya Pradesh became *85.5 million* [12]. Furthermore, only *307.56 lakh hectares* of the state is used for agriculture which is *about 9.38%* of the whole country [13]. Production value of different crops in Madhya Pradesh is presented above through a table. *About 19.61 million tonnes* wheat, *4.82 million tonnes* coarse cereals, *3.8 million tonnes* pulses, *33.03 million tonnes* food grains, *5.15 million tonnes* soybean and *6.57 million tonnes* oilseeds are produced in Madhya Pradesh (refer to excel). Thus, implementing policies to prevent population growth and enhancing employment rate of the state will enhance opportunities for the state to prevent the challenges regarding food insecurity.

#### Food security challenges in Rajasthan

Rajasthan is another large state within India with a total of 8.07 Crore population. It is identified that *25.633 million hectare* lands of Rajasthan are used for growing crops including bajra, moong, oat, wheat, dolichos bean, palak, carrot, mustard, methi and others [14]. Poverty level is increasing in Rajasthan which is a minor challenge for the state regarding food security. *About 16%* of the rural population of Rajasthan are living under the poverty line [15]. An effective growth in the population of the state is identified which is a big challenge for the state that leads to food insecurity. The population of Rajasthan was *7.71 Crore in 2018* and that turned to *8.07 Crore in 2021* [16]. Production volume of different crops is presented through a table below. It is identified that the volume crop production is not enough to complete the needs of the population of Rajasthan. Apart from that, food waste is another challenge in the state that is leading to food insecurity.

Crops	Production (million tonnes)
Coarse Cereals	7.29
Total Pulses	4.49
Groundnut	1.62
Rapeseed & Mustard	4.22
Soyabean	0.52
Total Oilseeds	6.79

**Table 3:** Production of different crops in Rajasthan  
(Source: Excel)

### 3. RESULTS AND DISCUSSION

Main factors affecting the food security issues in India are found as *population growth, employment in the agricultural sector, increased level of poverty gap, inflation and poverty headcount ratio at national poverty lines*. A wide range of data is incorporated from the World Bank in respect of the aforementioned factors. It is evident that unequal distribution of population within a country leads to the threat to food availability [17]. From the collected data it is found that the rate of urban population has increased at a greater pace than the rural one across India. On the other hand unemployment is identified as the major factor in India that results in reducing the financial capacities of a certain group of citizens to access the required quantity of nutrition. As a result, the number of underweighted children as compared to age has increased along with the cases of malnourishment. The collected set of data is evaluated through suitable statistical tools and the results obtained are as follows.

#### Statistical analysis of the secondary quantitative data

**Employment in agriculture (% of total employment) (modeled ILO estimate)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	42.5999984741211	1	3.1	3.4
	43.3300018310547	1	3.1	6.9
	43.9300003051758	1	3.1	10.3
	44.5600013732910	1	3.1	13.8
	45.2599983215332	1	3.1	17.2
	45.8899993896484	1	3.1	20.7
	46.5000000000000	1	3.1	24.1
	47.0000000000000	1	3.1	27.6
	49.2599983215332	1	3.1	31.0
	51.5200004577637	1	3.1	34.5
	52.5000000000000	1	3.1	37.9
	53.5099983215332	1	3.1	41.4
	54.1100006103516	1	3.1	44.8
	55.0800018310547	1	3.1	48.3
	56.0000000000000	1	3.1	51.7
	56.7799987792969	1	3.1	55.2
	57.7599983215332	1	3.1	58.6
	58.5999984741211	1	3.1	62.1
	59.0999984741211	1	3.1	65.5
	59.6500015258789	1	3.1	69.0
	60.0900001525879	1	3.1	72.4
	60.7200012207031	1	3.1	75.9
	61.119999318848	1	3.1	79.3
	61.3499984741211	1	3.1	82.9
	61.7599983215332	1	3.1	86.2
	62.1800003051758	1	3.1	89.7
	62.6599984741211	1	3.1	93.1
	62.9900016784688	1	3.1	96.6
	63.3199986948242	1	3.1	100.0
Total	29	90.6	100.0	
Missing	System	3	9.4	
Total		32	100.0	

**Figure 4:** Percentage employment distribution in Indian agricultural sector

The above data is obtained from the World Bank report between the year range of 1991 and 2020. It is found that the rate of employment has decreased across the Indian agricultural sector as compared to the previous years. Main reason behind such a reduction includes the propensity of availing alternative job options among the descendants of the people associated

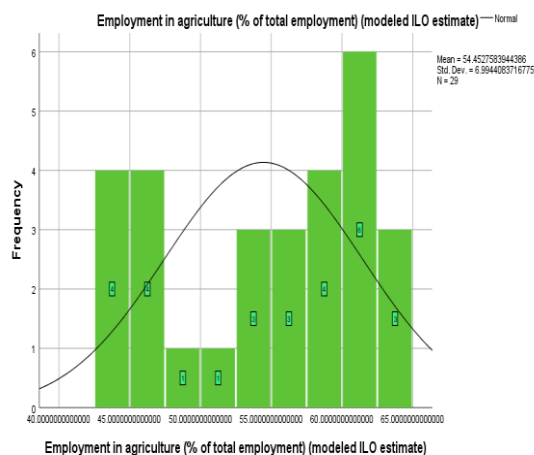
with agricultural activities in India. Such an attitude has reduced the production of adequate volume of agricultural products in the recent period. Apart from that *trade liberalization* has also affected the food production capacities of small producers and considered to influence them for quitting the agricultural activities [18]. On the contrary, availability of advanced machinery and implication of innovative techniques have contributed to an increased level of food production index in India.

**Food production index (2014-2016 = 100)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 4.66982038037591	1	3.1	3.4	3.4
50.640000000000000	1	3.1	3.4	6.9
52.570000000000000	1	3.1	3.4	10.3
54.290000000000000	1	3.1	3.4	13.8
55.900000000000000	1	3.1	3.4	17.2
57.310000000000000	1	3.1	3.4	20.7
59.350000000000000	1	3.1	3.4	24.1
61.110000000000000	1	3.1	3.4	27.6
61.530000000000000	1	3.1	3.4	31.0
62.090000000000000	1	3.1	3.4	34.5
64.560000000000000	1	3.1	3.4	37.9
64.910000000000000	1	3.1	3.4	41.4
66.570000000000000	1	3.1	3.4	44.8
66.630000000000000	1	3.1	3.4	48.3
67.700000000000000	1	3.1	3.4	51.7
70.140000000000000	1	3.1	3.4	55.2
73.680000000000000	1	3.1	3.4	58.6
79.610000000000000	1	3.1	3.4	62.1
79.990000000000000	1	3.1	3.4	65.5
81.530000000000000	1	3.1	3.4	69.0
85.630000000000000	1	3.1	3.4	72.4
90.870000000000000	1	3.1	3.4	75.9
92.970000000000000	1	3.1	3.4	79.3
96.990000000000000	1	3.1	3.4	82.8
98.280000000000000	1	3.1	3.4	86.2
99.490000000000000	1	3.1	3.4	89.7
102.230000000000000	1	3.1	3.4	93.1
107.770000000000000	1	3.1	3.4	96.6
111.770000000000000	1	3.1	3.4	100.0
Total	29	90.6	100.0	
Missing System	3	9.4		
Total	32	100.0		

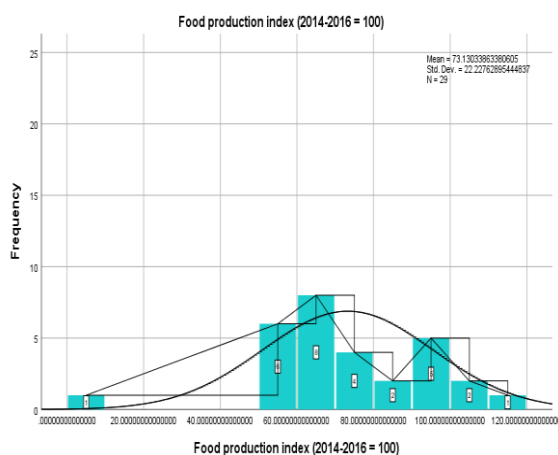
**Figure 5:** Food production index in India

Despite having an increased rate of agricultural production, the excess amount of export and unequal distribution of food grains across the domestic market results in an elevator level of poverty across India. The increased rate of poverty was found in India in the previous period and that rate has decreased in the later years due to positive strategic measures implemented by the Indian government. Different schemes such as *MGNREGA* have been implemented by the recent Indian government to alleviate poverty among the affected people [19]. Moreover, establishment of food grain banks is significant to ensure a continuous supply of rice and wheat in the market. Moreover non-cereal crops such as oil seeds, fruits and vegetables are also accumulated by the food grain banks. As a result crop diversification is ensured and the poverty level is reduced in the marginal areas of the society.



**Figure 6:** Rate of agricultural engagement in India

A reduced amount of agricultural subsidy results in the reducing employment engagement across the Indian agricultural sector. However the present government is focused on improving the overall productivity of the agricultural sector along with reviving the economic condition of associated farmers. A **Public Grievance Cell** is also established to deal with the grievances of the employees [20]. Thus adequate administrative control is maintained across the agricultural industry and cooperation between the farmers and the official personnel is established at the government level. Such a strategic measure has ensured employee retention in the Indian agricultural sector in a positive manner.



**Figure 7:** Relative comparison of food production index in India

As depicted in the above figure the rate of food production has fluctuated around the previous period in India. Main reason behind it includes the commercialization of agriculture that has resulted in a decline in the gross area of agricultural activities. Therefore the crop production has fluctuated in an intermittent manner across India. However 70% of the total population depends on agricultural activities for their livelihood and nourishment [21]. Thus, the government is having an approach to facilitate better techniques of farming, increased irrigation, provision of high quality seeds and fertilizers among farmers. It helps in reviving the food production index in the recent period.

		Correlations			
		Increase in poverty gap at \$1.90 (\$ 2011 PPP) poverty line due to out-of-pocket health care expenditure (% of poverty line)	Inflation, consumer prices (annual %)	Population growth (annual %)	Poverty headcount ratio at national poverty lines (% of population)
Increase in poverty gap at \$1.90 (\$ 2011 PPP) poverty line due to out-of-pocket health care expenditure (% of poverty line)	Pearson Correlation	1	-.732**	.977**	.922*
	Sig. (2-tailed)		.002	.000	.026
	N	15	15	9	5
Inflation, consumer prices (annual %)	Pearson Correlation	-.732**	1	-.423*	-.489
	Sig. (2-tailed)	.002		.050	.325
	N	15	30	22	6
Population growth (annual %)	Pearson Correlation	.977**	-.423*	1	.956*
	Sig. (2-tailed)	.000	.050		.044
	N	9	22	22	4
Poverty headcount ratio at national poverty lines (% of population)	Pearson Correlation	.922*	-.489	.956*	1
	Sig. (2-tailed)	.026	.325	.044	
	N	5	6	4	6

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

**Figure 8:** Correlation among poverty, population and inflation



The above correlation table depicts that inflation has a significant role in increasing the level of poverty across a county. A high rate of inflation becomes harmful for the poor due to the result of constrained accessibility to financial services [22]. A negative correlation (-.732) between inflation and poverty depicts that the income opportunity of the common people become unequal and it directly affects the equal accessibility of food by the citizens. On the other hand the population growth is prevalent in Indian society that consequently increases the demand for basic amenities of food. However, lack of adequate economics capabilities to obtain the adequate quantity of food has led to deviation from the food security standards across the country.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.766 <sup>a</sup>	.587	.380	2.6366

a. Predictors: (Constant), Poverty headcount ratio at national poverty lines (% of population)

**Figure 9:** Regression analysis between poverty and population

The values of R and R square depicts that the prediction made by the researcher is 76.6% significant along with 58.7% dependence of increased poverty on the population growth. An uncontrolled population rise in rural areas and scarcity of adequate food delivery opportunities leads to an increased poverty headcount ratio in the recent period.

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.724	1	19.724	2.837	.234 <sup>b</sup>
	Residual	13.904	2	6.952		
	Total	33.628	3			

a. Dependent Variable: Prevalence of undernourishment (% of population)  
b. Predictors: (Constant), Poverty headcount ratio at national poverty lines (% of population)

**Figure 10:** ANOVA table

In the present case the sig. value is found to be .234 that is greater than the significance level of .05. Hence, the data set depicting poverty as the main reason behind undernourishment is considered to be improved by incorporating other factors. For an example the consequences of poverty leads to lack of concern about nutrition among the rural population results in an increased level of malnutrition among rural children. It is also true that natural resources and agricultural products are available extensively in the rural areas. However commercialization of agro products results in transport of food items in the urban market. Thus lack of adequate volume of food items results in an extensive level of undernourishment among the Indian population. 189.2 million Of common people are suffering from undernourishment in India in 2020 [23]. Moreover 34.7% children under the age group of 5 years suffer from malnutrition among the entire population. Therefore it is recommended to implement an appropriate poverty alleviation program in the rural areas to ensure a desired level of nutritional gain among the required population.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.487	2.556		5.278	.034
	Poverty headcount ratio at national poverty lines (% of population)	.164	.097	.766	1.684	.234

a. Dependent Variable: Prevalence of undernourishment (% of population)

**Figure 11:** Coefficient table

The above table shows that the main factor associated with undernourishment among the Indian population. Based on this factor the regression equation can be configured as follows: Prevalence of undernourishment = 13.487 + .164 (Poverty headcount ratio)

		Prevalence of underweight, weight for age (% of children under 5)	Rural population growth (annual %)
Prevalence of underweight, weight for age (% of children under 5)	Pearson Correlation	1	.911*
	Sig. (2-tailed)		.031
	N	5	5
Rural population growth (annual %)	Pearson Correlation	.911*	1
	Sig. (2-tailed)	.031	
	N	5	30

\*. Correlation is significant at the 0.05 level (2-tailed).

**Figure 12:** Correlation between rural population growth and underweight children

The above correlation shows that there is a strong significant relationship between the rural population growth and prevalence of underweight children under the age group of 5 years. It is supported by the key findings of other authors regarding the malnutrition among rural children. 38% of the Indian children are found to be stunted whereas 35% are identified with underweight symptoms in the rural areas [24]. Therefore the present research is also reliable in terms of the gathering of valid set of data and information from authentic resources.

		Unemployment, total (% of total labor force) (modeled ILO estimate)	Urban population growth (annual %)
Unemployment, total (% of total labor force) (modeled ILO estimate)	Pearson Correlation	1	.333
	Sig. (2-tailed)		.090
	N	29	27
Urban population growth (annual %)	Pearson Correlation	.333	1
	Sig. (2-tailed)	.090	
	N	27	27

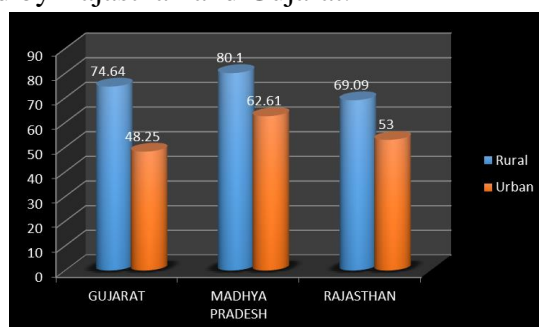
**Figure 13:** Correlation between urban population and unemployment growth

Based on the data gathered regarding urban population and unemployment in India a weak relationship is found between these two factors. It is evident that extensive population growth is prevalent in India along with the elevated rate of unemployment in the recent period. However, population growth is not the only factor for increasing the unemployment rate. Lack of adequate education and propensity of career oriented lookout also result in developing scarcity of employees with the desired qualities. It results in underemployment and lack of capabilities among the common people to avail food required for standard level of

nutrition. However, the rate of urban malnutrition is lower than that in the rural areas. It is due to the availability of adequate facilities regarding food distribution through different channels for the common people. It has resulted in a suitable facility of poverty eradication aligned with the standard of food security across the Indian urban areas.

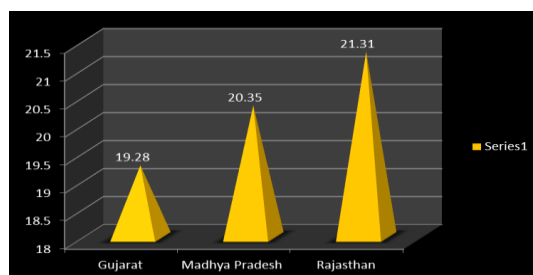
### Comparative discussion among Gujarat, Madhya Pradesh and Rajasthan

It is found that the rural population is the maximum in Madhya Pradesh followed by Gujarat and Rajasthan. On the other hand, maximum urban population is also associated with Madhya Pradesh followed by Rajasthan and Gujarat.



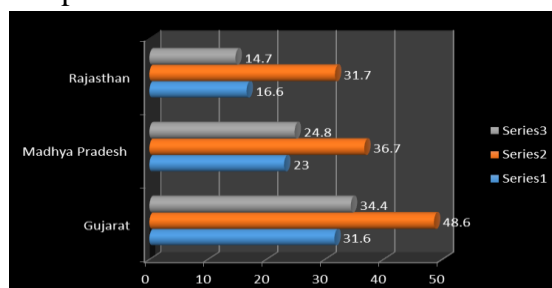
**Figure 14:** Comparative population in rural and urban areas

On the other hand the population growth is the maximum in Rajasthan followed by Madhya Pradesh and Gujarat as per the census of 2001 to 2011.



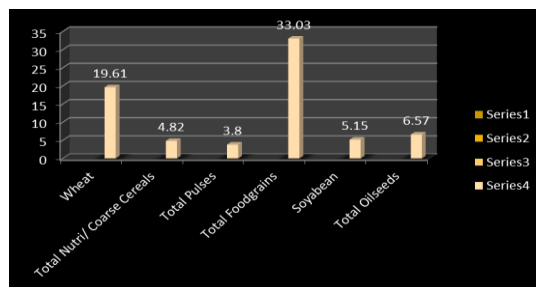
**Figure 15:** Population growth in Indian states

The below figure shows that the least percentage of population below the poverty line resides in Rajasthan as per the data collected in respect of 2011-12. Based on the above three crucial data it can be stated that the Rajasthan government has taken adequate strategies to eradicate poverty from the state as compared to the other two Indian states incorporated in this study.



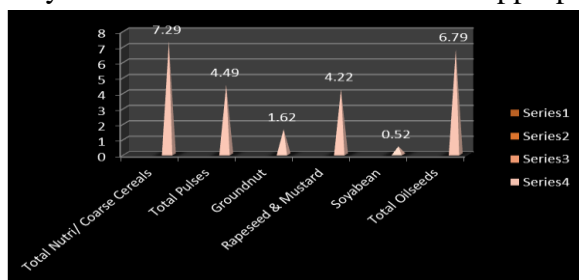
**Figure 16:** Percentage of population below poverty line

Despite having an increased rate of population growth, strategies such as provision of maintaining equal food distribution in both the rural and urban areas has resulted in an adequate availability of food grain among the Rajasthan population. However, it is found that Madhya Pradesh has secured the top position among all the three included states in terms of producing food grains and crops as follows.



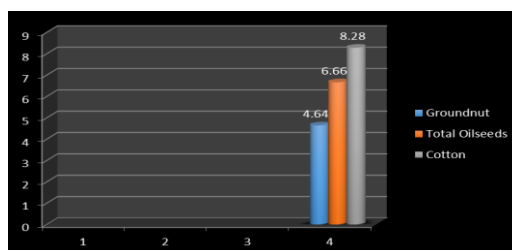
**Figure 17:** Crops produced in Madhya Pradesh

It is found that Madhya Pradesh has topped in Wheat production followed by total oilseeds, Soyabean, total nutri- products and pulses in 2019. Thus it results in meeting the food consumption habits made by the common citizen in this state appropriately.



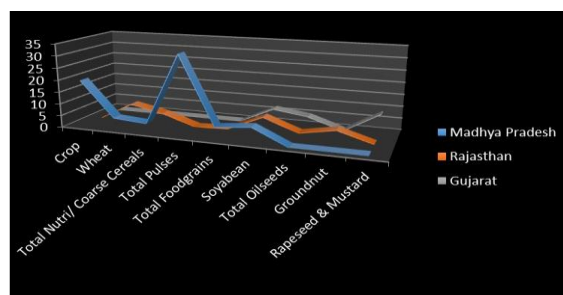
**Figure 18:** Crops produced in Rajasthan

In terms of cereal production, Rajasthan has secured a standard position in 2019 that has contributed in satisfying the food demands made by all the population in the state. Hence, the rate of undernourishment and malnutrition has reduced among both the rural and urban population associated with Rajasthan in the recent period. However, monitoring of all the nutritional programme across the state is required to improve the existing conduction along with reaching the position across India.



**Figure 19:** Crops produced in Gujarat

The above figure shows that Gujarat has a distinct position in terms of producing agricultural products different from Rajasthan and Madhya Pradesh. The state is associated with a significant level of cotton production followed by oil seeds and groundnut. It is evident that all the aforementioned agricultural items do not have direct impact on meeting the food demands made by the common citizen. However, the state government of Gujarat earns a significant amount of revenue by selling an adequate amount of these products to other Indian states. Moreover, it also helps the Indian government to conduct a profitable export activity in terms of these products. Thus, it can be stated that through producing the aforementioned items an adequate amount of monetary assets are earned and that can be used to improve the financial status of ground level farmers. A comparative analysis of all the three states is depicted by the below figure in respect of producing different crops (on million tons) in the fiscal period 2019-20.



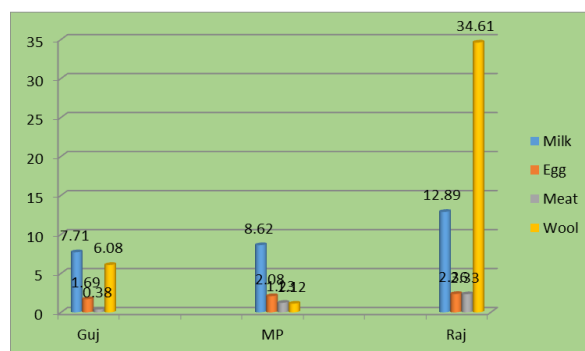
**Figure 20:** Comparative representation of crop production

In terms of total food grain production the rank of Madhya Pradesh is found to be at the top as 33.03 million tons of production is found in 2019-20. On that note null production is found in Gujarat and Rajasthan. Thus based on the below data it can be stated that the Rajasthan agricultural department has played a significant role in producing an adequate amount of food grains to ensure a required delivery of food items among the common citizen across the state.

Crop	Madhya Pradesh	Rajasthan	Gujarat
Wheat	19.61	0	0
Total Nutri/ Coarse Cereals	4.82	7.29	0
Total Pulses	3.8	4.49	0
Total Food grains	33.03	0	0
Soyabean	5.15	0.52	0
Total Oilseeds	6.57	6.79	6.66
Groundnut	0	1.62	4.64
Rapeseed and Mustard	0	4.22	0
Cotton	0	0	8.28

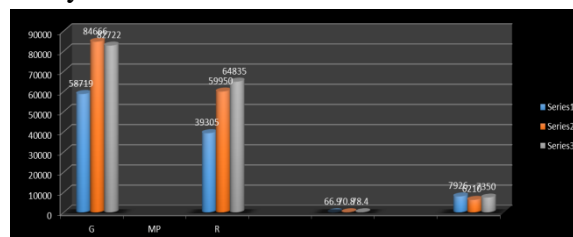
**Table 4:** Difference in Crop production in Madhya Pradesh, Rajasthan and Gujarat

Apart from the production of agricultural food grains a comparative data is also gathered in terms of bi-products such as milk, egg, meat and wool. It is presented through the following figure.



**Figure 21:** Comparative representation of agricultural bi-products

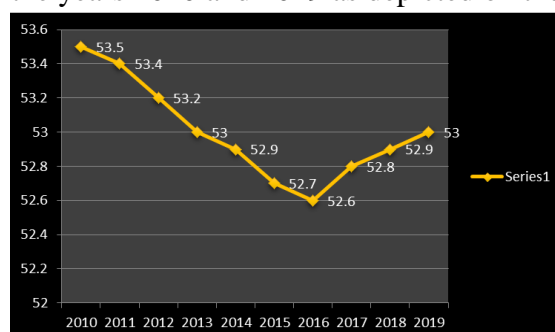
It is found that Rajasthan has topped in the wool production along with producing other items of milk, egg and meat. This data signifies that the Rajasthan government has played a significant role in producing an adequate amount of food items and other agricultural products to satisfy all the population residing across the rural and urban areas. It has resulted in attaining a potential position of Rajasthan in the Indian agricultural industry in respect of meeting the demands made by the common citizens.



**Figure 22:** Portion of agricultural households

Based on the above figure it can be stated that Rajasthan has the maximum number of estimated agricultural households as compared to the total rural population. It accounts for 78.4% of the rural population associated with agricultural activities in the recent period. However, in terms of average monthly income per agricultural household Gujarat has secured the top most position. It is found that on an average an agricultural member earns an amount of Rs. 7926 in Gujarat followed by Rajasthan and Madhya Pradesh. Therefore, the Gujarat government is well focused on providing a suitable monetary support to the ground level farmers. However, this amount is also required to be aligned with external financial conditions in the national market.

Apart from that a positive trend in agricultural growth is found to be prevalent since 2016-17 in Gujarat. Before that period the standard agricultural practices were quite challenging across the state. At that period, the women belonging to the reproductive age group were found with extensive anemia. However, the condition of anemia has not been improved in a suitable manner between the years 2010 and 2019 as depicted on the figure below.



**Figure 23:** The rate of anemia among women of reproductive age

Along with that the prevalence of children with different symptoms of undernourishment is also found across the three states incorporated in this study as depicted below.

Prevalence of wasting	Prevalence of stunting
17.3 in 2012	20.1 in 2020
41.7 in 2012	30.9 in 2020

**Table 5:** Symptoms of undernourishment among children in 2020

The above discussion shows that the government authorities associated with the chosen Indian states have implemented suitable strategies to improve the rate of crop production along with other agricultural products. However, the prevalence of undernourishment among children below the age group of 5 years and women are prevalent across India as per the data collected from the government websites. Therefore, all the corresponding government bodies should take innovative strategies to mitigate the challenging situations in respect of providing equal facilities to all the citizens for obtaining adequate food facilities in the future.

#### 4. CONCLUSION

Food security is one of the major critical factors in India that is impacting the lives of the population of India. The study mainly sheds light on Gujarat, Madhya Pradesh and Rajasthan which are the three largest states of India. It is identified that the percentage of the population who live under the poverty line is increasing in all these three states. Apart from that, the population is also increasing and these are enhancing challenges for the states regarding food security.

#### 5. CONTRIBUTION

Different articles and journals are reviewed for collecting information and the authors of those journals have highly contributed. Governmental sites and news journals are majorly used for using some relevant data in the study.

#### 6. CONFLICT OF INTERESTS

“The author declares that there is no conflict of interests”.

#### References

1. India today. 71% of Indians cannot afford a healthy diet: CSE Report. 2022; [Online] <https://www.indiatoday.in/india/story/indians-cannot-afford-healthy-diet-cse-report-1958179-2022-06-04#:~:text=At%20least%2042%25%20of%20the,legumes%2C%20nuts%20and%20whole%20grains.>
2. Statista. Leading states and union territories with the largest share of people living below the poverty line in India in 2021. 2022; [Online] <https://www.statista.com/statistics/1269976/india-population-living-below-national-poverty-line-by-state/>
3. Barrett D, Twycross A. Data collection in qualitative research. *Evidence Based Nursing*. 2018;21(3):63-64. <https://ebn.bmj.com/content/ebnurs/21/3/63.full.pdf>
4. Michel P. Model of neo-Malthusian population anticipating future changes in resources. *Theoretical Population Biology*. 2021;140:16-31. <https://www.sciencedirect.com/science/article/pii/S0040580921000198>
5. Mohamed Nour S, Abdalla E. The determinants of food security in Sudan: the case of Kassala state. *World Journal of Science, Technology and Sustainable Development*. 2021;ahead-of-print(ahead-of-print). [https://www.researchgate.net/profile/Eltayeb-Abdalla/publication/351173018\\_The\\_determinants\\_of\\_food\\_security\\_in\\_Sudan\\_the\\_case\\_of\\_Kassala\\_state/links/609d85e2299bf14769962204/The-determinants-of-food-security-in-Sudan-the-case-of-Kassala-state.pdf](https://www.researchgate.net/profile/Eltayeb-Abdalla/publication/351173018_The_determinants_of_food_security_in_Sudan_the_case_of_Kassala_state/links/609d85e2299bf14769962204/The-determinants-of-food-security-in-Sudan-the-case-of-Kassala-state.pdf)
6. Ingutia R, Sumelius J. Determinants of food security status with reference to women farmers in rural Kenya. *Scientific African*. 2022;15:e01114. <https://www.sciencedirect.com/science/article/pii/S2468227622000230>

7. Gujarat.pscnotes. Gujarat Food security. 2022; [online] <https://gujarat.pscnotes.com/gujrat-economy/gujrat-food-security/?amp=1>
8. Population. Gujarat Population. 2022; [Online] <https://www.populationu.com/in/gujarat-population>
9. Pib.gov. Millet Production. 2022; [Online] <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1796559#:~:text=Through%20the%20efforts%20made%20by,tonnes%20during%20the%20same%20period.>
10. All Gujarat news. One third of Gujarat is poor, if BJP was good then why poverty does not disappear in 26 years. 2021; [Online] <https://allgujaratnews.in/en/one-third-of-gujarat-is-poor-if-bjp-was-good-then-why-poverty-does-not-disappear-in-26-years/#:~:text=In%202018%2C%20it%20was%2025,to%20Gujarat%2C%20poverty%20has%20increased.>
11. Times of India. 1/3rd population under poverty in Madhya Pradesh. 2021; [Online] <https://timesofindia.indiatimes.com/city/bhopal/1/3rd-population-under-poverty-in-madhya-pradesh/articleshow/87956675.cms>
12. Population. Madhya Pradesh Population. 2022; [Online] <https://www.populationu.com/in/madhya-pradesh-population>
13. Mpkrisshi.mp.gov. MADHYA PRADESH - HISTORY & CURRENT OVERVIEW IN AGRICULTURE. 2022; [Online] [http://mpkrishi.mp.gov.in/Englishsite\\_New/Aboutus\\_English.aspx#:~:text=In%20rabi%20season%2C%20wheat%2C%20gram,total%20area%20of%20the%20country](http://mpkrishi.mp.gov.in/Englishsite_New/Aboutus_English.aspx#:~:text=In%20rabi%20season%2C%20wheat%2C%20gram,total%20area%20of%20the%20country)
14. Farmechnic.gov. Department of Agriculture & Cooperation Mechanisation & Technology Division. 2022; [Online] <https://farmech.dac.gov.in/FarmerGuide/RJ/index1.html>
15. Rajras. Poverty in Rajasthan. 2018; [Online] <https://www.rajras.in/poverty-in-rajasthan/>
16. Census2011. Rajasthan Population 2022. 2022; [Online] <https://www.census2011.co.in/census/state/rajasthan.html>
17. Hill R, Narayan A. Covid-19 and inequality: a review of the evidence on likely impact and policy options. Centre for Disaster Protection Working Paper. 2020 Dec;3. DOI: 10.31389/lseprr.26
18. Singh P. Indian agriculture under open economic regime: Implication for livelihood and food security. Journal of Asian and African Studies. 2020 Dec;55(8):1176-93. <https://doi.org/10.1177/0021909620916908>
19. Vasudevan G, Singh S, Gupta G, Jalajakshi CK. MGNREGA in the Times of COVID-19 and Beyond: Can India do More with Less?. The Indian Journal of Labour Economics. 2020 Sep;63(3):799-814. DOI: 10.1007/s41027-020-00247-0
20. agricoop.nic.in. Annual Report. 2020-21. Department of Agriculture, Cooperation & Farmer's Welfare. 2022. [www.agricoop.nic.in](https://agricoop.nic.in/sites/default/files/Web%20copy%20of%20AR%20%28Eng%29_7.pdf). [https://agricoop.nic.in/sites/default/files/Web%20copy%20of%20AR%20%28Eng%29\\_7.pdf](https://agricoop.nic.in/sites/default/files/Web%20copy%20of%20AR%20%28Eng%29_7.pdf)
21. Patel SK, Sharma A, Singh GS. Traditional agricultural practices in India: an approach for environmental sustainability and food security. Energy, Ecology and Environment. 2020 Aug;5(4):253-71.
22. Sehrawat M, Giri AK. The impact of financial development, economic growth, income



- inequality on poverty: evidence from India. *Empirical Economics*. 2018 Dec;55(4):1585-602.
23. [www.indiafoodbanking.org](https://www.indiafoodbanking.org). Hunger in India. India Food Banking Network. 2022. <https://www.indiafoodbanking.org/hunger#:~:text=According%20to%20FAO%20estimates%20in,to%2049%20years%20are%20anaemic>.
24. Singh S, Srivastava S, Upadhyay AK. Socio-economic inequality in malnutrition among children in India: an analysis of 640 districts from National Family Health Survey (2015–16). *International journal for equity in health*. 2019 Dec;18(1):1-9.