Analysis of population demographic and the demand and supply of food in India

Seminar Paper



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Economics of Growth and Development

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# KEYWORDS

*Food self sufficiency; Food market; Regression analysis (GDP, Population, Rainfall, Food Production Index, Livestock Production Index, Cereals, Meat); Food security; Nutritional security; Consumption pattern; Nutritional Demand and supply analysis; Food demand and supply analysis; Import and Export; India; Food; Nutrition*

# ABSTRACT

*An analysis of population demographic and the demand and supply of food in India*

India, a country with diversity as vivid as a Van Gogh has always had self sufficiency and eradicating poverty at the centre of its socio-economic goals which is also evident from its agricultural policies. In the last few decades, there have been many developments in the world, yet, regardless of the cultural, economical and social changes that India has undergone in the form of rising population, growing economy, increasing urbanisation and changing tastes and preferences, its core goals remain the same.

With its ever rising population along with the shifting food purchase patterns due to changing consumer demographic, taste, lifestyle, economic conditions and health concerns, there is an increased pressure on its limited resources to not only cater to the demands of the rising population but also to provide for the changing taste.

Over the years, many studies have been conducted on nutritional status, food security and self sustainability but studies on nutritional food with factors determining their demand and supply have been scarce. Therefore, it becomes imperative to bridge this wide gap in our knowledge and grow our awareness about the various factors which affect the demand and supply market of nutritional food.

Hence, In these dynamic times, This paper attempts to analyse the effects of different population demographic factors such as GDP per capita, total population and other factors such as rainfall on the demand and supply of different types of food in India. This paper serves as a very evident and sound mathematical analysis of the above mentioned factors on the demand and supply market, and assess the current and recent past’s demand-supply gap. This paper shall extract such relevant information that will be useful to evolve appropriate medium- and long-term strategies in the food sector through statistical analysis.

# INTRODUCTION

India has witnessed significant progress in most of its endeavours like science, technology, industrialisation, defence, art etc. Even after achieving this rare feat, availability and affordability of a nutritious and healthy meal, which is the basic requirement of the majority of population of our country, is still unfulfilled. The Indian economy is now one of the fastest-growing economies in the world. Real GDP per head grew at 3.95% a year from 1980 to at around 7% a year in 2010s. India’s economy has grown rapidly and has been evolving constantly. In the post-economic reforms period, India not only experienced rapid economic transformation but also substantial changes in many other dimensions of well-being, including its methods of nutrition intake.

According to The World Bank Report (2011), “South Asia still has the highest rates and the largest number of undernourished children in the world,” and also “The high economic growth experienced by South Asian countries has not made an impact on the nutritional status of South Asian children.” However, it should also be noted that India has shown improvement in most of the above mentioned indicators in the past few years by adopting various policy measures to improve food availability and security with the support of international agencies. Although the progress in this direction has been slow and satisfactory levels are yet to be attained, there is a noticeable improvement in the availability of food to people along with the quantity of food being consumed(not necessarily the quality).

With this background, this paper attempts to highlight and statistically analyse in detail a wide variety of aspects of nutritional food supply and demand in India. Factors that shall be taken into consideration to assess the Nutritional food demand and supply are: Food production index, Livestock production index, GDP per capita, Population, Life expectancy to name a few.

**Certain general trends-**

* Increasing differentiation. This applies to consumer attitudes and desires. Consumer demand for food breaks down into an increasing number of groups, and demand is also becoming more differentiated at the level of the individual consumer. On the supply side, the food market is becoming increasingly segmented.
* Increased polarisation. Among consumers, there is an identifiable split in demand between high-end products and cheap offers, partly as a function of income. The middle market segment is accordingly losing market share.
* Growing convergence. Despite the growing diversity of the food supply, differences are blurring. One contributing factor, for example, is the increasingly scientific nature of food production, and the rising number of stages in processing.

# OBJECTIVE

Our food choices affect our health — how we feel today, tomorrow, and in the future. Having a balanced diet plays an integral role in leading a healthy lifestyle. Intake of nutritional food can help us to maintain a healthy weight, promotes our mental and physical health and reduce the risk of diseases. Poor nutrition can invite many diseases, some of which are common nowadays due to people’s poor eating habits. These diseases include diabetes, obesity, cardiovascular problems and hypoglycaemia.

These diseases, most of which are long-term illnesses, could be easily prevented by living a healthy lifestyle.

There has never been a better time to study nutrition! Health, nutrition and food were never discussed so much in our lives before. Before writing this seminar paper we have read many research papers but none of them explained in detail about the various factors that affect nutritional food demand and supply in India in detail. So it becomes important to bridge this wide gap in our knowledge and grow our awareness about nutritional food and various factors which affect the demand and supply in this market.

This raises a lot of questions, Does increasing GDP per capita increase our nutritional food supply and demand? Does the ever increasing population of India pose a hindrance to the availability of nutritional food to people? This paper shall attempt to enable the reader to answer these questions through a statistical point of view.

# HYPOTHESIS

**Hypothesis 1**:

GDP per capita is a significant factor in determining FPI

* H0: B1 equals to 0
* H1: B1 not equal to 0

Here B1 is the coefficient of GDP per capita

**Hypothesis 2**:

Population is a significant factor in determining LPI

* H0: B2 equal to 0
* H1: B2 not equal to 0

Here B2 is the coefficient of Population

**Hypothesis 3**:

FPI is a significant factor in determining quantity of cereals demanded

* H0: B3 equal to 0
* H1: B3 not equal to 0

Here B3 is the coefficient of FPI

**Hypothesis 4**:

FPI is a significant factor in determining quantity of meat demanded

* H0: B4 equal to 0
* H1: B4 not equal to 0

Here B4 is the coefficient of FPI

# LITERATURE REVIEW

This paper talks about the effect of different factors on the demand and supply of different nutrients. Hence, it becomes imperative that we clearly define the different categories of nutrients and importance.

Types of Nutrients:

* MICRONUTRIENTS
  + Minerals
  + Vitamins
* MACRONUTRIENTS
  + Carbohydrates
  + Fats
  + Proteins
  + Fibre
  + Water

Thus, as defined above, only foods with actual nutritional value is taken in this study. And foods such as tea and coffee are excluded as they have no nutritional value.

Many states in India are practically large to exist as an independent country with several ethnic groups, socio-economic levels, health facilities, different food habits, etc. As a result, there is significant variation between the nutritional status of the population of different states since it results from a varying combination of factors.

Intake of nutritional food in India have been constantly changing and in past couple of decades, consumption of some cereals such as millets has declined considerably, while the consumption of dairy products, oils and salt have increased (Misra et al., 2011). Three-Fourths of the population of India are estimated to have deficiency of micronutrients as their diets have failed to provide them necessary levels of vitamins and minerals such as Vitamin A, Vitamin D, proteins and iron that are generally found in the Indian diet in green vegetables, cereals, dairy products and pulses (Rao et al., 2018). So highlighting this diet-related burden of India is the need of the hour.

**~~Recent trends:~~**

~~Recent nutrition trends in India present some interesting puzzles. Looking upon the anthropometric indicators, the nutritional status of our country seems to have improved a lot as compared to last few decades, though this improvement is sluggish. Anthropometric data from the National Nutrition Monitoring Bureau (NNMB), for instance, suggests that in the 1980s and 1990s there was a slow increase in the heights and weights of Indian children. National Family Health Survey conducted in the year 1992-93 and 1998-99 also points in the same direction. Moreover, both the sources of NNMB and NFHS suggest similar rates of reduction of undernutrition over time.~~

~~Data from National Sample Survey (NSS) indicates that there has been a decline in average cereal intake from 11.4 to 10.2 kgs per month in urban areas and from 14.8 kgs per month to 12.5 kgs per month between 1983-84 and 2000-01 in rural areas (Deaton, 2006). Amongst the higher income groups, this decline was considerably sharp. For instance, cereal consumption saw a decline from 18.8 to 13.4 kgs per month in this period amongst the top 21% of the rural population in terms of monthly per capita income.~~

~~According to National Sample Survey data, in rural India, per-capita calorie intake had seen a marginal decline from 2221 kcal per day in 1983-84 to 2149 kcal per day in 1999-2000 (NSSO, 2001). In fact, apart from few exceptions such as Vitamin C, per-capita intake of most of the nutrients witnessed a decline (Sharma, 2006). This data also appears to be consistent with independent evidence from the National Nutrition Monitoring Bureau(NNMB). Here again, higher monthly per-capita consumer expenditure(MPCE) groups witnessed a sharp decline. Moreover there is little indication of considerable increase in nutritional food demand amongst the poorer groups in 1980s and 1990s.~~

**A Comparison of demand Projections:**

The prediction of the future demand of nutritional food have been made by different scholars in the past under assumptions of GDP per capita, population growth rates etc., at different base years. These predictions were mainly for cereals, wheat, rice and pulses based on NSS consumer expenditure data. Bhalla (2011), computed demand for total cereals in 2020 as 374.7 MT. New estimates on livestock growth were used in this study which are based on the assumption that GDP growth would be around 7.5% and also considered IMPACT model. The study by Kumar (2008) used the Food Characteristic Demand System (FCDS) according to which he predicted the total demand for cereals to be 223.7 MT in 2010 and 265.7 MT in 2020.

**Projected food demand for India, by different studies. (Unit: Million Metric Tonnes)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Source: NSSO 2016** | **Year** | **Rice** | **Wheat** | **Total Cereals** | **Pulses** | **Edible oil** | **Sugar** |
| Mittal \*  under scenario 2  (9% GDP growth) | 2011 | 94.4 | 59.0 | 188.5 | 24.1 | 16.8 | 29.3 |
| 2021 | 96.8 | 64.3 | 245.1 | 42.5 | 30.2 | 65.7 |
| 2026 | 102.1 | 65.9 | 277.2 | 57.7 | 40.9 | 100.7 |
| Rosegrant et al. (1995) | 2020 | - | - | 237.3 | - | - | - |
| Kumar (2008) | 2010 | 103.6 | 85.8 | 223.7 | 23.0 | - | - |
| 2020 | 122.1 | 102.8 | 265.7 | 30.9 | - | - |
| Bhalla (2011) | 2020 | - | - | 374.7 | - | - | - |
| Thamarajakshi (2001) | 2020 | - | - | 274.0 | - |  |  |
| Hanchate &  Dyson (2004) | 2026 | - | - | 217.6 | 16.0 |  |  |

Hanchante and Dyson (2001) also predicted the total demand for cereals to be 217.6 mt in 2026. In this paper, cereal projections were made at the state level which were subsequently summarized at the country level. The base year considered for most of these studies is 1994. Rosegrant’s study for total cereals were close to these estimates whereas Bhalla’s (2001) study for total cereals are observed to be considerably different from that of other studies.

**Supply Projections:**

Some supply projections have been made under the technological change, assumptions of cropping pattern shift, yield growth etc. Hanchante and Dyson (2001) calculated projections of supplies using area and projections of yield for total cereals and pulses for 2026.Domestic production in 2026 will be 265.8 mt according to the paper. Predictions of various nutritional foods according to various research papers have been summarized below:

**Projected food supply for India, by different studies (Unit: Million Metric tonnes)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Source** | **Year** | **Rice** | **Wheat** | **Total Cereals** | **Pulses** | **Oilseed** | **Sugarcane** |
| Mittal | 2011 | 95.7 | 80.2 | 209.7 | 16.1 | 29.9 | 245.0 |
| 2021 | 105.8 | 91.6 | 242.2 | 17.6 | 36.9 | 255.2 |
| 2026 | 111.2 | 97.9 | 260.2 | 18.4 | 41.1 | 260.5 |
| Kumar (1998) | 2010 | 109.3 | 96.0 | 248.4 | - | - | - |
| 2020 | 134.0 | 127.3 | 309.0 | - | - | - |
| Mittal (2000) | 2010 | 112.7 | 94.8 | - | - | - | 289.0 |
| 2020 | 149.3 | 128.5 | - | - | - | 298.1 |
| Kumar & Mittal (2003) | 2010 | 107.8 | 95.4 | 236.8 | 13.9 | - | - |
| 2020 | 127.0 | 111.5 | 274.0 | 15.2 | - | - |
| Hanchate & Dyson (2004) | 2026 | - | - | 265.8 | 23.7 | - | - |

Having highlighted the past, current and future predictions of the demand and supply trends, the policies and changing demographics that accompanied them and the effects that these changes caused or affected or were simply followed by, this paper shall now attempt to bridge the gap between the known and the unknown through its objectives.

# METHODOLOGY

**Variables:**

**Food Production Index (FPI):** Food production index covers food crops that are considered edible and that contain nutrients. Coffee and tea are excluded because, although edible, they have no nutritive value. Practically all products are covered, with the main exception of fodder crops. The agricultural production index is prepared by the Food and Agriculture Organization of the United Nations (FAO). The FAO indices of agricultural production show the relative level of the aggregate volume of agricultural production for each year in comparison with the base period 2004-2006. They are based on the sum of price-weighted quantities of different agricultural commodities produced after deductions of quantities used as seed and feed weighted in a similar manner. The resulting aggregate represents, therefore, disposable production for any use except as seed and feed. Time frame of the data is from 1961 to 2016. This index at the country, regional and world levels is calculated by the Laspeyres formula. A Laspeyres Index is known as a "base-weighted" or "fixed-weighted" index because the price increases are weighted by the quantities in the base period. The Consumer Price Index is an example of a Laspeyres Index. Agricultural data are collected by the Food and Agriculture Organization of the United Nations (FAO) from official national sources through the questionnaire and are supplemented with information from official secondary data sources. The secondary sources cover official country data from websites of national ministries, national publications and related country data reported by various international organizations.

<http://www.usna.edu/Users/econ/rbrady/312%20Materials/LaspeyresCalc.pdf>

**Livestock Production Index (LPI):** Livestock production index includes meat and milk from all sources, dairy products such as cheese, and eggs, honey, raw silk, wool, and hides and skins. Methodology for calculation of Livestock production index is very to similar to the calculation methodology of Food production index. Both feed and seed originating from within the livestock sector (e.g. milk feed, hatching eggs) are removed from the group "livestock products". For the main two livestock subgroups, namely, meat and milk, only feed originating from the respective subgroup is removed similar to the removal of fodder crops in the food production index. Base period is still considered to be 2004-06. Time frame of the data is from 1961 to 2016. This index is also calculated using the same Laspeyres index as explained above. The data is directly collected from

**GDP per capita growth (%):** Annual percentage growth rate of GDP per capita based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data on this variable is directly collected from World Bank national accounts, and OECD National Accounts data files.

**Population Growth (%):** Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates. This data is also directly calculated from the World Bank data website and then converted to growth terms.

**Rainfall (in mm):** Rainfall is taken from the year 1961 till 2016 in millimetres. This rainfall is averaged out over the entire year.

**Geographic coverage:**

In terms of geography, we first analysed the supply and demand of nutritional food in India as a whole.

Secondly we analysed state-wise intake of calorie(kcal), protein(gm), fat(gm) as of the 68th round of NSSO report on “Nutritional Intake of India”, i.e. for the years 2011-12. Moving over to the supply side, we have also analysed the estimates on production of major livestock products in the year 2016-17. To see how the nutritional intake levels depends on various levels of poverty, we plotted a scatter plot of time versus levels of intake.

**Population coverage:**

The Production index of food and livestock are regressed upon the population of India for the time period 1961 to 2016, to see whether increase in population results in any actual increase in the production levels of food and livestock.

**Regressions:**  
Besides various time series and comparative analysis, we have regressed the supply of food and livestock on various factors, which are detailed below. The model mainly uses time series data of various explained above. Moreover, demand of Cereals and pulses is also regressed on upon these factors. Non veg consumption has been exempted from this analysis due to the following reasons:

#### Data is very scarcely available.

#### People eating flesh products replace the proportionate intake of pulses and dairy products. Thus, analysis of both the food groups are assumed to be approximately same.

**Final Regressions:**

#### ***FPI{t} = β0+β1(GDP per capita growth {t}) +β2(Population growth {t}) +β3(Rainfall{t}) +******µ{t}***

#### β0- The intercept term specifies how the index is changing with zero change in GDP per capita growth, population growth and rainfall.

#### β1- This coefficient specifies the marginal change in the index with respect to 1% increase or decrease in GDP per capita.

#### β2- This coefficient specifies the marginal change in the index with respect to 1% increase or decrease in Population growth.

#### β3-This coefficient specifies the marginal change in the index with respect to 1 unit increase or decrease in Rainfall.

#### µt- The error or disturbance term takes into account the deviations from trend. These deviations may arise due to unusual conditions like periods of recessions or unusually large amounts of rainfall.

#### ***LPI{t} = β0+β1(GDP per capita growth{t}) +β2(Population Growth {t}) + µ{t}***

#### β0- The intercept term specifies how the index is changing with zero change in GDP per capita growth, population growth.

#### β1- This coefficient specifies the marginal change in the index with respect to 1% increase or decrease in GDP per capita.

#### β2- This coefficient specifies the marginal change in the index with respect to 1% increase or decrease in Population growth.

#### µt- The error or disturbance term takes into account the deviations from trend. These deviations may arise due to unusual conditions like periods of recessions.

***Note:*** *FPI – Food Production Index, LPI – Livestock Production Index, GDP – Gross Domestic Product*

# RESULTS AND CONCLUSIONS

**Regressions:**

#### ***FPI{t} = β0+β1(GDP per capita growth {t}) +β2(Population growth {t}) +β3(Rainfall{t}) +******µ{t}***

Initial regression consisted of variables GDP, Population and Rainfall. Though through further analysis it was found that high values of GDP and population led to the problem of heteroskedasticity and thus were changed to the aforementioned.

Despite our initial suspicions Food Production Index (FPI) does not significantly depend upon the rainfall received. According to the t-test, GDP per capita and log (Population) are the only two significant variables in determining the FPI. Our model is overall significant pertaining to the high F-stat value. An 88.51% R2 shows that both the independent explanatory variables explains the variation in FPI over the years to a great extent. Positive value coefficient estimates of both the GDP per capita and log(Population) (log taken to remove heteroskedasticity) suggests that FPI increases with increase in GDP per capita and Population. This might be due to fact that higher per capita income results in higher demand for food which in turn results in inflation in food prices thus finally resulting in an increase in supply.

#### ***LPI{t} = β0+β1(GDP per capita growth{t}) +β2(Population Growth {t}) + µ{t}***

Initial regression consisted of variables GDP and Population. Though through further analysis it was found that high values of GDP and population led to the problem of heteroskedasticity and thus were changed to the aforementioned.

Result of this regression analysis were particularly shocking. Though the model itself turned out to significant, GDP per capita was found to be an insignificant variable at 5% significance level. Population on the other hand was in fact significant and had a positive coefficient estimate leading to the conclusion that increase in population results in greater livestock production.

**Other Analysis**:

***Fisheries Production***:

As can be seen from the graph below production of fisheries have increased at an approximately constant rate through the years from 1990 to 2018 as expected from the increasing population of non-vegetarians India.

***Net food grain availability per capita per year***:

The per capita per year net availability of rice, wheat, cereals as a whole and food grains (total) have increased over the years with a dip or two in the recent years. But the availability of pulses and other cereals, which include cereals like bajra etc., have decreased and only recently began to stabilize.

***Estimates of state-wise production of major livestock products 2016-17***:

***Production of wheat and rice from 1960 to 2019***:

As can be seen from the graph, the wheat and rice production is steadily growing across the country with increasing technological development. The abnormal dips in the production of wheat and especially rice can be due to adverse weather conditions like draughts, floods etc.

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Links:

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https://www.indexmundi.com/agriculture

https://data.worldbank.org/

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https://www.indexmundi.com/agriculture

# APPENDIX

Data Tables

A.1 FPI and LPI Data

|  |  |  |
| --- | --- | --- |
| **Year** | **Food Production Index** | **Livestock Production Index** |
| **1961** | 32.12 | 24.5 |
| **1962** | 31.68 | 24.61 |
| **1963** | 32.4 | 24.67 |
| **1964** | 33.23 | 24.62 |
| **1965** | 31.67 | 24.72 |
| **1966** | 31.63 | 25.04 |
| **1967** | 33.55 | 25.49 |
| **1968** | 35.4 | 26.71 |
| **1969** | 36.62 | 27.19 |
| **1970** | 38.52 | 26.94 |
| **1971** | 38.96 | 28.48 |
| **1972** | 37.34 | 28.87 |
| **1973** | 40.31 | 29.51 |
| **1974** | 39.04 | 30.78 |
| **1975** | 43.38 | 31.96 |
| **1976** | 42.99 | 33.62 |
| **1977** | 46.53 | 34.89 |
| **1978** | 48 | 35.6 |
| **1979** | 45.78 | 37.13 |
| **1980** | 47.65 | 38.65 |
| **1981** | 51.02 | 41.12 |
| **1982** | 50.71 | 43.59 |
| **1983** | 56.79 | 46.28 |
| **1984** | 57.86 | 48.63 |
| **1985** | 59.1 | 51.2 |
| **1986** | 60.08 | 53.1 |
| **1987** | 59.54 | 54.31 |
| **1988** | 65.24 | 55.9 |
| **1989** | 68.93 | 58.62 |
| **1990** | 70.13 | 60.66 |
| **1991** | 71.13 | 61.68 |
| **1992** | 74.12 | 63.8 |
| **1993** | 76.9 | 66.06 |
| **1994** | 79.03 | 68.33 |
| **1995** | 81.05 | 71.75 |
| **1996** | 84.09 | 74.18 |
| **1997** | 86.51 | 76.29 |
| **1998** | 88.02 | 79.1 |
| **1999** | 92.14 | 82.5 |
| **2000** | 91.53 | 84.62 |
| **2001** | 94.63 | 87.86 |
| **2002** | 87.38 | 89.62 |
| **2003** | 96.38 | 91.62 |
| **2004** | 94.74 | 95.85 |
| **2005** | 100.03 | 99.83 |
| **2006** | 105.23 | 104.32 |
| **2007** | 114.49 | 110.92 |
| **2008** | 117 | 114.55 |
| **2009** | 114.27 | 118.54 |
| **2010** | 123.19 | 123.49 |
| **2011** | 130.87 | 128.2 |
| **2012** | 133.81 | 131.89 |
| **2013** | 139.06 | 136.32 |
| **2014** | 142.88 | 143.11 |
| **2015** | 141 | 149.7 |
| **2016** | 144.39 | 152.71 |

<https://data.worldbank.org/indicator/AG.PRD.FOOD.XD?locations=IN>

A.2 Indicators Data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **GDP (current US$)** | **Population, total** | **GDP per capita (current US$)** | **Inflation, GDP deflator (annual %)** | **Life expectancy at birth, total (years)** |
| **1960** | 37029883875 | 450547679 | 82.18860201 |  | 41.422 |
| **1961** | 39232435784 | 459642165 | 85.35430117 | 2.14542765 | 42.027 |
| **1962** | 42161481859 | 469077190 | 89.88175669 | 4.40561673 | 42.637 |
| **1963** | 48421923459 | 478825608 | 101.1264282 | 8.353623886 | 43.252 |
| **1964** | 56480289941 | 488848135 | 115.537497 | 8.551676966 | 43.873 |
| **1965** | 59554854575 | 499123324 | 119.3189172 | 8.300369406 | 44.5 |
| **1966** | 45865462034 | 509631500 | 89.99730596 | 13.27070656 | 45.136 |
| **1967** | 50134942203 | 520400576 | 96.33913665 | 8.616204711 | 45.779 |
| **1968** | 53085455871 | 531513824 | 99.8759646 | 2.415383587 | 46.428 |
| **1969** | 58447995017 | 543084336 | 107.6223178 | 3.34336434 | 47.081 |
| **1970** | 62422483055 | 555189792 | 112.4344935 | 1.562243485 | 47.737 |
| **1971** | 67350988021 | 567868018 | 118.6032421 | 5.32484105 | 48.398 |
| **1972** | 71463193830 | 581087256 | 122.9818639 | 10.8396027 | 49.061 |
| **1973** | 85515269586 | 594770134 | 143.7786881 | 17.82971565 | 49.722 |
| **1974** | 99525899116 | 608802600 | 163.4781112 | 16.66751573 | 50.374 |
| **1975** | 98472796457 | 623102897 | 158.0361718 | -1.64868155 | 51.012 |
| **1976** | 1.02717E+11 | 637630087 | 161.0920917 | 5.981859342 | 51.63 |
| **1977** | 1.21487E+11 | 652408776 | 186.2135013 | 5.637229339 | 52.222 |
| **1978** | 1.373E+11 | 667499806 | 205.6933861 | 2.460282317 | 52.786 |
| **1979** | 1.52992E+11 | 682995354 | 224.0010168 | 15.72804321 | 53.319 |
| **1980** | 1.86325E+11 | 698952844 | 266.5778481 | 11.50832081 | 53.814 |
| **1981** | 1.93491E+11 | 715384993 | 270.4706024 | 10.82758198 | 54.268 |
| **1982** | 2.00715E+11 | 732239504 | 274.1113314 | 8.095863097 | 54.686 |
| **1983** | 2.18262E+11 | 749428958 | 291.2381101 | 8.552859607 | 55.074 |
| **1984** | 2.12158E+11 | 766833410 | 276.6679586 | 7.923232845 | 55.441 |
| **1985** | 2.32512E+11 | 784360008 | 296.4351516 | 7.193785446 | 55.801 |
| **1986** | 2.48986E+11 | 801975244 | 310.4659351 | 6.789400453 | 56.169 |
| **1987** | 2.79034E+11 | 819682102 | 340.4168316 | 9.327893305 | 56.553 |
| **1988** | 2.96589E+11 | 837468930 | 354.1492516 | 8.232515365 | 56.963 |
| **1989** | 2.96042E+11 | 855334678 | 346.1128873 | 8.436808873 | 57.4 |
| **1990** | 3.20979E+11 | 873277798 | 367.5566093 | 10.66830385 | 57.865 |
| **1991** | 2.70105E+11 | 891273209 | 303.0556053 | 13.75181894 | 58.353 |
| **1992** | 2.88208E+11 | 909307016 | 316.9539279 | 8.96515236 | 58.851 |
| **1993** | 2.79296E+11 | 927403860 | 301.1590042 | 9.861782853 | 59.349 |
| **1994** | 3.27276E+11 | 945601831 | 346.1029503 | 9.980044775 | 59.84 |
| **1995** | 3.60282E+11 | 963922588 | 373.76648 | 9.06270222 | 60.32 |
| **1996** | 3.92897E+11 | 982365243 | 399.9500768 | 7.575018288 | 60.783 |
| **1997** | 4.15868E+11 | 1000900030 | 415.493797 | 6.476271263 | 61.233 |
| **1998** | 4.21351E+11 | 1019483581 | 413.2989342 | 8.010167523 | 61.669 |
| **1999** | 4.5882E+11 | 1038058156 | 441.9987596 | 3.068395521 | 62.093 |
| **2000** | 4.68395E+11 | 1056575549 | 443.3141934 | 3.644970161 | 62.505 |
| **2001** | 4.85441E+11 | 1075000085 | 451.5730011 | 3.215616017 | 62.907 |
| **2002** | 5.14938E+11 | 1093317189 | 470.9867859 | 3.715683777 | 63.304 |
| **2003** | 6.07699E+11 | 1111523144 | 546.7266145 | 3.867798086 | 63.699 |
| **2004** | 7.09149E+11 | 1129623456 | 627.7742473 | 5.725413227 | 64.095 |
| **2005** | 8.20382E+11 | 1147609927 | 714.8610135 | 5.621903263 | 64.5 |
| **2006** | 9.4026E+11 | 1165486291 | 806.7532806 | 8.400938217 | 64.918 |
| **2007** | 1.21674E+12 | 1183209472 | 1028.334771 | 6.944418254 | 65.35 |
| **2008** | 1.1989E+12 | 1200669765 | 998.522339 | 9.193969626 | 65.794 |
| **2009** | 1.34189E+12 | 1217726215 | 1101.96084 | 7.040365435 | 66.244 |
| **2010** | 1.67562E+12 | 1234281170 | 1357.563719 | 10.52603086 | 66.693 |
| **2011** | 1.82305E+12 | 1250288729 | 1458.103527 | 8.7335779 | 67.13 |
| **2012** | 1.82764E+12 | 1265782790 | 1443.879529 | 7.934388476 | 67.545 |
| **2013** | 1.85672E+12 | 1280846129 | 1449.605912 | 6.186504001 | 67.931 |
| **2014** | 2.03913E+12 | 1295604184 | 1573.881492 | 3.331756917 | 68.286 |
| **2015** | 2.10359E+12 | 1310152403 | 1605.605431 | 2.279588108 | 68.607 |
| **2016** | 2.29043E+12 | 1324509589 | 1729.268021 | 3.124227441 | 68.897 |
| **2017** | 2.65224E+12 | 1338658835 | 1981.268706 | 3.835504789 | 69.165 |
| **2018** | 2.71873E+12 | 1352617328 | 2009.978857 | 4.111608823 |  |

<https://data.worldbank.org/country/india>

A.3 Cereals, Gram and Pulses Consumption Demand

|  |  |  |  |
| --- | --- | --- | --- |
| **YR** | **cereals** | **gram** | **pulses** |
| **1951** | 334.2 | 22.5 | 60.7 |
| **1961** | 399.7 | 30.2 | 69 |
| **1971** | 417.6 | 20 | 51.2 |
| **1981** | 417.3 | 13.4 | 37.5 |
| **1991** | 468.5 | 13.4 | 41.6 |
| **2001** | 386.2 | 8 | 30 |
| **2011** | 410.7 | 14.5 | 43 |

A.4 Meat Consumption Demand

|  |  |
| --- | --- |
| **TIME** | **MEAT** |
| **2007** | 1791400 |
| **2008** | 1919100 |
| **2009** | 2120800 |
| **2010** | 2226150 |
| **2011** | 2515600 |
| **2012** | 2712800 |
| **2013** | 2878822 |
| **2014** | 3073960 |
| **2015** | 3291664 |
| **2016** | 3335846 |

A.5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Estimates on production of major livestock products, 2016-17*** | | | | |
| **States/UTs** | Milk | Egg | Meat | Fish |
| (In 000'Tonne) | (In Lakhs Nos) | (In 000'Tonne) | (in 000' Tonnes) |
| **Andaman and Nicobar Islands** | 16 | 1032 | 5 | 38 |
| **Andhra Pradesh** | 12178 | 158274 | 633 | 2333 |
| **Arunachal Pradesh** | 53 | 495 | 20 | 4 |
| **Assam** | 861 | 4771 | 47 | 292 |
| **Bihar** | 8711 | 11117 | 326 | 495 |
| **Chandigarh** | 36 | 154 | 1 | 0 |
| **Chhattisgarh** | 1374 | 16638 | 49 | 317 |
| **Dadra and Nagar Haveli\*** | 8 | 73 | 0 | 0 |
| **Daman and Diu** | 1 | 18 | 1 | 28 |
| **Delhi\*** | 279 | 0 | 66 | 1 |
| **Goa** | 51 | 292 | 7 | 115 |
| **Gujarat** | 12784 | 17940 | 33 | 826 |
| **Haryana** | 8975 | 52139 | 427 | 111 |
| **Himachal Pradesh** | 1329 | 959 | 4 | 11 |
| **Jammu and Kashmir** | 2376 | 2305 | 85 | 20 |
| **Jharkhand** | 1894 | 5103 | 55 | 118 |
| **Karnataka** | 6562 | 50671 | 209 | 696 |
| **Kerala** | 2520 | 23444 | 469 | 681 |
| **Lakshadweep** | 3 | 147 | 0 | 12 |
| **Madhya Pradesh** | 13445 | 16940 | 79 | 115 |
| **Maharashtra** | 10402 | 54774 | 845 | 621 |
| **Manipur** | 79 | 992 | 27 | 31 |
| **Meghalaya** | 84 | 1064 | 41 | 6 |
| **Mizoram** | 24 | 408 | 15 | 7 |
| **Nagaland** | 79 | 397 | 31 | 8 |
| **Odisha** | 2003 | 19745 | 177 | 470 |
| **Puducherry** | 48 | 116 | 15 | 70 |
| **Punjab** | 11282 | 47826 | 249 | 125 |
| **Rajasthan** | 18500 | 13633 | 180 | 44 |
| **Sikkim** | 54 | 68 | 4 | 0 |
| **Tamil Nadu** | 7556 | 166824 | 573 | 698 |
| **Telangana** | 4681 | 118186 | 591 | 264 |
| **Tripura** | 160 | 2294 | 40 | 64 |
| **Uttar Pradesh** | 27770 | 22889 | 1346 | 538 |
| **Uttarakhand** | 1692 | 4119 | 28 | 4 |
| **West Bengal** | 5183 | 65536 | 706 | 1632 |
| **India** | **165404** | **881386** | **7386** | **10795** |
| ***Source: State/UT Animal Husbandry Departments*** | | | | |

A.6

Fisheries Production

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Marine** | **Inland** | **Total** |
| **1990-91** | **2300** | **1536** | **3836** |
| **2000-01** | **2811** | **2845** | **5656** |
| **2009-10** | **3104** | **4894** | **7998** |
| **2010-11** | **3250** | **4981** | **8231** |
| **2011-12** | **3372** | **5294** | **8666** |
| **2012-13** | **3321** | **5719** | **9040** |
| **2013-14** | **3443** | **6136** | **9579** |
| **2014-15** | **3569** | **6691** | **10260** |
| **2015-16** | **3600** | **7162** | **10762** |
| **2016-17** | **3641** | **7781** | **11422** |
| **2017-18** | **3688** | **8917** | **12606** |

A.7 Net Foodgrains Avilability per capita per year (in kgms)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Rice** | **Wheat** | **Other Cereals** | **Cereals (total)** | **Pulses** | **Food grains (total)** |
| **1951** | **58** | **24** | **40** | **122** | **22.1** | **144.1** |
| **2011** | **66.3** | **59.7** | **23.9** | **149.9** | **15.7** | **170.9** |
| **2012** | **69.4** | **57.8** | **21.9** | **149.1** | **15.2** | **169.3** |
| **2013** | **72.1** | **66.8** | **19.2** | **158.1** | **15.8** | **179.5** |
| **2014** | **72.3** | **66.8** | **22.6** | **161.6** | **16.9** | **178.6** |
| **2015** | **67.9** | **61.3** | **28.4** | **153.8** | **16** | **169.8** |
| **2016** | **67.2** | **72.9** | **26.1** | **162** | **15.7** | **177.7** |
| **2017** | **66.8** | **66.7** | **29.4** | **158.4** | **20** | **178.4** |
| **2018(P)** | **69** | **64.4** | **31.2** | **160** | **20.4** | **180.3** |

A.8 Wheat and Rice Production (in 1000MT)

|  |  |  |
| --- | --- | --- |
| **Year** | Wheat Production(1000 MT) | Rice production(1000MT) |
| 1960 | 10320 | 34639 |
| 1961 | 10995 | 35663 |
| 1962 | 12076 | 33217 |
| 1963 | 10779 | 36998 |
| 1964 | 9854 | 39308 |
| 1965 | 12258 | 30589 |
| 1966 | 10394 | 30438 |
| **1967** | 11393 | 37612 |
| 1968 | 16540 | 39761 |
| 1969 | 18651 | 40430 |
| 1970 | 20093 | 42225 |
| 1971 | 23832 | 43068 |
| 1972 | 26410 | 39245 |
| 1973 | 24735 | 44051 |
| 1974 | 21778 | 39579 |
| 1975 | 24104 | 48740 |
| 1976 | 28846 | 41917 |
| 1977 | 29010 | 52617 |
| 1978 | 31749 | 53773 |
| 1979 | 35508 | 42330 |
| 1980 | 31830 | 53631 |
| 1981 | 36313 | 53248 |
| 1982 | 37452 | 47116 |
| 1983 | 42794 | 60097 |
| 1984 | 45476 | 58337 |
| 1985 | 44069 | 63825 |
| 1986 | 47052 | 60416 |
| 1987 | 44323 | 56862 |
| 1988 | 46169 | 70489 |
| 1989 | 54110 | 73573 |
| 1990 | 49850 | 74291 |
| 1991 | 55134 | 74680 |
| 1992 | 55690 | 72868 |
| 1993 | 57210 | 80300 |
| 1994 | 59840 | 81810 |
| 1995 | 65470 | 76980 |
| 1996 | 62097 | 80736 |
| 1997 | 69350 | 82545 |
| 1998 | 66350 | 86077 |
| 1999 | 71288 | 89683 |
| 2000 | 76369 | 84977 |
| 2001 | 69681 | 93334 |
| 2002 | 72766 | 71814 |
| 2003 | 65761 | 88522 |
| 2004 | 72156 | 83127 |
| 2005 | 68637 | 91785 |
| 2006 | 69355 | 93345 |
| 2007 | 75807 | 96682 |
| 2008 | 78570 | 99172 |
| 2009 | 80679 | 89083 |
| 2010 | 80804 | 95970 |
| 2011 | 86874 | 105301 |
| 2012 | 94882 | 105241 |
| 2013 | 93506 | 106646 |
| 2014 | 95850 | 105482 |
| 2015 | 86527 | 104408 |
| 2016 | 87000 | 109698 |
| 2017 | 98510 | 112760 |
| 2018 | 99870 | 116420 |
| 2019 | 102190 | 115000 |