A Discourse on Food Security of India

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ABSTRACT

This paper analyses the demand and supply of food in the context of food security in India so as to understand the domestic policies needed to control food problems and food inflation. First, we could consider supply side policies needed to ensure that the rising demand can be met and food inflation controlled. Concerted action will be needed to increase agricultural yields, given that cropped land will be hard to increase. These include improving irrigation facilities, better seeds, improved cold storage and transportation facilities, reallocation of land from cereals and pulses to vegetables and fruits, etc. Second, we estimate food demand in India by categories such as cereals, vegetables, fruits, dairy products, and meat using consumption data available under different studies. Our analysis shows that the structure of demand by food category is in the process of undergoing significant changes with rising income levels, and that the demand for fruits, vegetable, cooking oils, dairy products, and meat will increase by 60–75 per cent over the next 10 years, while demand for cereals will increase only 10 per cent, and that for pulses will decline slightly. Finally, we discuss the food security issues and required measures to be followed by the government for ensuring food security in future.

Keywords: Food demand, Food supply, Food inflation, Food security.

1.0 Introduction

Food is the basic material which the body needs for its survival and well-being; good food is indispensable for health at all stages of life and for satisfactory growth during infancy, childhood, adolescence and adulthood and old-age-hood. India’s food grain production has increased from 82 million tons in 1960-61 to about 265 million tons in 2013-14. Presently, it has increased at the rate of 2.68 per cent per annum.

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India has now become self-sufficient in food grains production from near famine situation prevailing during mid-sixties. Public investment in irrigation and other rural development infrastructure together with improved crop production techniques such as high yielding variety seeds, chemical fertilizers, and plant protection measures have significantly helped to expand the food production. The substantial increase in food grains production has resulted in significant shifts not only in production trend but also in the availability of food grains. But the more important question is whether increase in food grains production would be sufficient to meet its increasing demand in the times to come. The structure of food basket is undergoing change as diets are diversifying from basic cereals to fruits, milk and milk products, meat, fish and eggs. Within the cereals, consumers seem to shift away from cheaper coarse cereals to fine varieties of rice and wheat. Population growth, rise in per capita income, urbanization, change in taste and preferences, economic growth, etc. are likely to change the supply and demand prospects for food in the years to come. In India, there are problems like food-shortage, malnutrition and food inflation thereby there is threat to food-security.

1.1 Significance and objectives of the study

Since providing nutritious food at the household level for ensuring food security is the major policy concern of the country, the present study has been undertaken to assess (i) the present food supply and the trend for future (ii) food demand projection for the next three decades in the context of food security, (iii) up-ward shift in food consumption pattern, from less or no nutritious to more and more nutritious and (iv) access to sufficient nutritious-food.

India is capable to meet any food security challenge in near future in terms controlling food-shortage, food-inflation and assuring nutritious food to all. The present paper focuses mainly on three objectives: (i) to assess the present food supply and the trend for future, (ii) to analyse the shift in food consumption pattern over years and (iii) to work-out the food demand projection for the next three decades in the context of food security respectively.

1.2 Methodology

The data on area, production, productivity and other related variables of important food grains were collected from different published sources such as Economic Survey of India; Reserve Bank of India Handbook-2013-14; Agricultural Statistics at a Glance; Agriculture in Brief for the period 1960-61 to 1998-99. The data on consumer expenditure for both rural and urban consumers were compiled from various rounds of National Sample Survey (NSS) Organization. The selective variables are used to
analyse the food situation in India. The study covers only major determinants of demand for and supply of food in India and it is based on secondary data only.

2.0 Review of Literature

Food security refers to the availability of food and one’s access to it. A household is considered food-secure when its occupants do not live in hunger or fear of starvation. Food availability, food utilization, and food access are the principle variables that define household food security and should guide interventions (George, 1999).

According to Goyal and Singh (2001), population growth, rise in per capita income, urbanization, change in taste and preferences, economic growth, etc. are likely to change the supply and demand prospects for food in the years to come. Providing food at the household level for ensuring food security is the major policy concern of the country (George, 1999). Among the major determinants of demand of food in India, it has been observed that household food demand has been primarily driven by growth in population and income (Sinha, 2010). Similarly, the then Finance Minister, Mr. Yashwant Sinha (NSSO 2001), has condescended to mention ‘agriculture and food economy’ in his budgetary dispatches primarily meant for industry and trade. He mentioned that, “Speeding up of the agricultural sector reforms and better management of the food economy is the broad strategy of the budget. Agricultural sector continues to be constrained by the existence of a number of inhibiting controls and regulations.” The government therefore proposed to review the operation of the Essential Commodities Act, 1955, and remove many of the restrictions that have been imposed on the free inter-State movement of food-grain and agricultural produce and also on the storage and stocking of such commodities (Kumar, 1996). The government also decided to review the list of commodities declared as essential under the said Act and bring their number down to the minimum required.

Most of the world’s food is provided by only twenty crop species: they are wheat, rice, corn, potatoes, barley, sweet potatoes, cassavas, soya-beans, oats, sorghum, peanuts, rye millets, chick-peas, sugarcane, sugar beets, pigeon peas, coconuts and bananas’ (Selvarajan and Ravishanker, 1996). The increase in cereal production (mainly rice and wheat) but decline in the percentage share of coarse grains and pulses in total food-grains production was witnessed since 1960s (Sinha, 2010). In estimating future food-grains demand, growth in population, urbanization, changes in per capita real income and consumption behaviour are the most important factors which influence the future food-grains demand (Kumar and Mathur, 1996)

Most of the researches paid attention on the proper balancing of demand and supply of food in India but there is need to be to have research on threat to food security
in future India. Keeping in view the demand and supply positions, present and in future, the present paper gives suitable and appropriate suggestions to the government to take necessary policy-measures to ensure food security to the people in future.

3.0. Discussion and Analysis

3.1. Supply-side analysis

Primitive societies were obtaining food through hunting and gathering but now the great majority of people are obtaining food from cultivated plants, forests, domestic animals, oceans, and fresh waters. However, the great majority of food for human populations is obtained from traditional land-based agriculture of crops and livestock. The supply-side aspects of food can be discussed as:

(i) Development of food sources: The main sources of food are:

(a) Crops: Out of about 2.5 lakh species of plants, only about 3,000 have been tried as agricultural crops, of which only 300 are grown for food and only 100 are being used on a large scale. Some crops provide food, whereas others provide commercial products (e.g., oils, fibres, etc.). Most of the world's food is provided by only twenty crop species: they are wheat, rice, corn, potatoes, barley, sweet potatoes, cassavas, soya-beans, oats, sorghum, pea-nuts, rye millets, chick-peas, sugarcane, sugar beets, pigeon peas, coconuts, and bananas. Out of these, rice, wheat, and corn are the three crops on which humanity depends for the majority of its nutrients and calories. Wheat and rice are especially important as they are the staple foods for most of the people in India and these two crops supply around 60% of the calories consumed directly by vitamins and fibres. Like food-grains, fruits, and vegetables (including vegetable oils) also make a large contribution to human diets. Altogether, they amount to nearly as large a quantity as corn. They are especially important because they are rich in vitamins, minerals, dietary fibre, and complex carbohydrates.

(b) Livestock: Domesticated animals are an important food source. The major domesticated animals used as food by human beings are cattle, sheep, goats, camel, rabbit, pig, poultry, reindeer, etc. Ruminants convert woody tissue of plants (cellulose) indigestible to people to human food. Milk and other dairy products, are being used by people everywhere.

(c) Aquaculture: It is the production of food from aquatic habitats — marine and freshwater. Fish and seafood contribute about 70 million metric tons of high quality protein to the world's diet, which is about one-half as much as that from land animals. Although aquaculture provides only a small amount of the India's food at present, but it is an important source of protein for the nation.
(ii) Increase in food production: The analysis reveals that increase in cereal production (mainly rice and wheat) but decline in the percentage share of coarse grains and pulses in total food-grains production is witnessed since 1960s. India’s total food grain production has increased at an annual growth rate of 2.68 per cent since 1960-61. The increase in food-grain production is mainly due to increase in yield. The growth rate food production was 2.44 per cent as against growth rate of area under food production 0.17 per cent per annum during 1960-61 to 1998-99. To project the future food-grains supply, based on past growth trend, the food-grain supply is expected to be about 291 and 342 million tons by 2020 and 2030 AD, respectively.

(iii) Government food policy: Since launching of First Five Year Plan, the government gave top priority to solve food problem- shortage of food and food inflation. Green Revolution, wheat revolution, white revolution, high yielding variety seeds program, grow more food, import of food grains, etc. are the main policy-measure programs implemented by the government to control food problem. Public Distribution System is the best institutional arrange to supply food at fair or subsidized price to the poor to get food at minimum quantity for survival. India imports minimum 20 million tons of food-grain every year, even in good harvest season for buffer stock operation by Food Corporation of India.

Estimating future food-grains supply: Projections based on past trend may not be realistic because of the fact that past production growth factors may not work in future and new sources of production growth may be found. Hence, food-grains production in India may not increase at the past growth trend. Therefore, it was assumed that growth rate as observed during 1990-99 will decline to a level of 80 and 70 per cent, by 2019-20 and 2029-30 respectively.

3.2. Demand-side analysis

While estimating future food grains demand, growth in population, urbanization, changes in per capita real income and consumption behaviour are the most important factors.

(i) Population growth and urbanization: The population growth rate has slowed down during the last decades and the growth rate is further expected to slow down. For the present study it is assumed that the population growth rate will decline at the rate of 0.05 per cent per year during the next three decades. Further, keeping in view the increase in urbanization over the last decades, it is also assumed that urbanization will increase by 0.3 per cent per annum. Based on these assumptions, India’s population is expected to reach to 1301.44 and 1378.22 million by 2019-20 and 2029-30 and urbanization is expected to increase to about 32, 35 and 38 per cent during this period, respectively.
(ii) **Per capita income**: The per capita income at current prices (base-year 2004-05) increased at the annual average growth of 489.6 per cent during 1952-2013. In future, we expect somewhat faster increase in money per capita income. So, it is assumed that per capita money income would grow at a slightly higher rate. Based on the above assumptions, the rate of growth in per capita consumption was worked out for each commodity by multiplying income elasticity of demand with growth rate in per capita income. The per capita human demand so obtained was multiplied by projected population for the respective period. To estimate the aggregate demand (human and non-human), the demand for non-human uses such as seeds, feeds, and wastage, was assumed to be 12.5 per cent of the aggregate demand of each commodity.

(iii) **Per capita monthly consumption expenditure**: Since the per capita income at current price has been increasing since 1951, accordingly per capita monthly consumption expenditure on food and non-food items increased much (Table 1).

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</thead>
<tbody>
<tr>
<td>Rural</td>
<td>0.03</td>
<td>80.16</td>
<td>1.02</td>
<td>26.31</td>
<td>35.31</td>
</tr>
<tr>
<td>Urban</td>
<td>5.01</td>
<td>138.7</td>
<td>1.90</td>
<td>39.47</td>
<td>52.88</td>
</tr>
</tbody>
</table>

Source: National Dairy Development Board-2012-13

(iv) **Upward shift in consumption pattern**: Shift in consumption pattern and future demand for food is analysed for both rural and urban India. Per capita cereal consumption exhibited a declining trend over years in both rural and urban India. This decline is larger in rural India i.e.12.19% than in urban India i.e.5.43% during 1961-99. Increase in per capita income and urbanization has led to changes in the composition of the food basket, with consumers moving from coarse cereals to superior cereals such as rice and wheat. The allocation of monthly per capita expenditure on food items showed structural shift in dietary pattern in favour of non-cereal food items such as fruits, vegetables, milk, meat, eggs and fish in both the areas.

**Projections of food demand**: Future food demand is also projected which is based on factors such as growth in population, growth in per capita income, urbanization and consumption behaviour. For projecting population, it is assumed that the growth in population will decline by 0.05 per cent per year in future and urbanization will increase by 0.3 per cent per annum. However, production at the assumed growth rate may not
increase in future because the past production growth factors in future may not work well in future also. Hence, in the absence of favourable past growth factors, the food supply to match the demand in future may be a matter of great concern for food security. To meet the demand, the increased production will have to be brought about mainly through increases in productivity as the possibility of area expansion is very minimal. In the base-year-2009-10, the expected demand for food may increase to 301 million tons by 2019-20 and to 330 million tons by 2029-30. Increase in demand for pulses is quite evident as this is the major source of protein for the vegetarian population. Demand for edible oil is projected to be 40.9 mt by 2026 and sugar demand is expected to increase almost nine-fold in 2026 from base year demand of 11.9 mt.

3.3. Food Security

Food security refers to the availability of food and one’s access to it. A household is considered food-secure when its occupants do not live in hunger or fear of starvation. According to the World Resources Institute, global per capita food production has been increasing substantially for the past several decades. Food availability, food utilization, and food access are the principle variables that define household food security and should guide interventions.

(i) Food availability: Sufficient quantities of appropriate, necessary types of food from domestic production, commercial imports, or donors, are consistently available to individuals, are in reasonable proximity to them, or are within their reach. The per capita net availability of food-grains has also increased from 395 grams per day in early 1950s to the level of 436 grams in 2003, this in spite of the rapid increase in population. In the words of Dantwala, Green Revolution has given a breathing time. As a result, there will be relief from anxiety of food shortage and the planners will concentrate more on Indian planning.

(ii) Food access: Individuals have adequate incomes or other resources to purchase an appropriate food needed to maintain consumption of an adequate diet and nutritional level.

(iii) Food utilisation: Food is properly used and many suitable techniques are employed for storage. At the global level, hunger results from political and economic inequality, environmental degradation, unjust trade policies, inappropriate technology, and other factors depending on local context. In India, the food inequality results by the lack of nutritional education, poor quality of food, and from inadequate quantities of the right kinds of food.
4.0. Conclusion and Recommendations

Since Independence, food problem or crisis has remained the chronic and burning problem of India that has affected adversely on socio-economic and political life of India. Population, per capita income and food price determines the demand for food whereas food production, food price, public distribution system and import determine the supply of food in the country. Population and per capita income have increasing trends so they may raise demand for food in future (Table 2). Food production is increasing slowly so it may raise food price still higher level thereby it mounts pressure on government to spend much on import of food-grains and food subsidy schemes. Of course, rising food price has positive-effect on supply of food but it discourages demand too (Table 2).

Table 2: Annual Average Growth Index of Variables

<table>
<thead>
<tr>
<th>Particulars/Year</th>
<th>1952-53</th>
<th>1990-91</th>
<th>2013-14</th>
<th>Annual Average Growth Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population(Million)</td>
<td>372</td>
<td>839</td>
<td>1233</td>
<td>3.79</td>
</tr>
<tr>
<td>Per Capita Income (Current Price) Base Year 2004-05 (Rs)</td>
<td>280</td>
<td>6249</td>
<td>83897</td>
<td>489.6</td>
</tr>
<tr>
<td>Food Production (Million tons)</td>
<td>54.5</td>
<td>176.39</td>
<td>264.77</td>
<td>0.064</td>
</tr>
<tr>
<td>Food Price Index (Different Base-Years)</td>
<td>88</td>
<td>199</td>
<td>259</td>
<td>3.19</td>
</tr>
<tr>
<td>Public Distribution Stock (Million Tons)</td>
<td>-</td>
<td>15.81</td>
<td>61.62</td>
<td>22.29</td>
</tr>
<tr>
<td>Import of Food (Rs in Billion)</td>
<td>-</td>
<td>0.005</td>
<td>698.65</td>
<td>10537.6</td>
</tr>
</tbody>
</table>


The major findings of the study have been summarised below.

(a) The supply of food has increased largely due to technological break-through in agriculture whereby the productivity per hectar also increased. The per capita net availability of food-grains has also increased from 395 grams per day in early 1950s to the level of 436 grams in 2003. To project the future food-grains supply, based on past growth trend, the food-grain supply is expected to be about 291 and 342 million tons by 2020 and 2030, respectively.

(b) The demand for food has also increased much; the per capita monthly expenditure on total food increased to Rs 404.33 and Rs 582.43 in 2009-10 in rural and urban
area respectively. The increasing population, per capita income and upward shift in consumption-pattern are the forces behind the ever increasing demand for food. The demand is further expected to rise to 301 million tons by 2019-20 and to 330 million tons by 2029-30.

(c) There is a threat to food security in future in India; the food supply may not match the demand in future so it may be a matter of great concern for food security. To meet the demand, the increased production will have to be brought about mainly through increases in productivity of land-based, animal-based and aqua-based sources of food.

(d) The government food policy and programs are capable to assure food security in India.

(e) There is dire need of creating awareness among people regarding proper use of food and enriching food nutrition.

4.1 Challenges in the area of food security

India is facing typical problems related to food and food security. Some of the important problems have been listed below.

(i) Hunger and starvation: Weaknesses in the variables of access, availability, and proper utilization of food lead to what individuals and households experience as hunger. There are considered to be two types of food insecurity: chronic and temporal; (a) Chronic food insecurity results from inadequate food intake over a longer period of time and is constant and (b) Temporal food insecurity results from a temporary decrease in food intake due to price changes, production failures, or a loss of income. Temporal food insecurity is the main problem in India.

(ii) Vicious circle of poverty and hunger: Poverty leads to hunger and vice-versa; families caught in a cycle of hunger and poverty find their opportunities and resources further diminished in other areas.

(iii) Food insufficiency: There are 6 groups of nutrients: carbohydrates, protein, fat, minerals, vitamins and water. It is essential to consume a percentage of each nutrient every day for overall health, without any of these nutrients a person will be malnutrition (lack of one or more essential nutrients in food), undernourishment (lack of sufficient calories, 2500, in available food) and malnourishment (lack of specific components of food such as proteins, vitamins, etc.). In general, humans can survive for two to eight weeks without food, depending on stored body fat. Survival without water is usually limited to three or four days. Lack of food remains a serious problem, with about 36 million humans starving to death every year in the world.

(iv) Food inflation: The continuous rise in food price is a major threat to food security
\( v \) Lack of dietary practices: A lack of breastfeeding can lead to malnutrition in infants and children. A healthy diet is one that helps maintain or improve health. It is important for the prevention of many chronic health risks such as: obesity, heart disease, diabetes, and cancer. Coronary heart diseases are a very common health problem and they are closely linked to a diet that is high in unhealthy fats. A healthy diet involves consuming appropriate amounts of all nutrients, and an adequate amount of water.

\( vi \) Agricultural productivity: Food shortages can be caused by a lack of farming skills such as crop rotation, or by a lack of technology or resources needed for the higher yields found in modern agriculture, such as nitrogen fertilizers, pesticides and irrigation.

\( vii \) Problem of balancing between demand and supply: In market-operated economy, it is rather difficult to maintain balance between demand and supply forces, due to excess manipulation by corporate big-bulls.

4.2 Recommendations

In the light of balancing between demand and supply of food and ensuring of food security, the following policy-measures need to be devised by the government:
(a) ‘Right to Food’ should be included in the list of constitutional fundamental rights.
(b) Government should keep control over cropping pattern; government should motivate farmers to adopt horticulture, vegetable production, etc. and the area under food should be protected.
(c) Conversion of agricultural land should be stopped; cities and towns growth be controlled.
(d) Nutritious food education and training should be given to people at all level of learning
(e) Adulteration, hoarding of essential commodities and excess intervention of middlemen in food market be controlled.
(f) Government should arrange programs to motivate the people to switch over from traditional less nutritious food consumption pattern to more nutritious food consumption pattern. Vegetarians should use vegetables, fruits and non-vegetarians should use aqua-based and insect-based food.
(g) Forest and environment protection policies should assure less climate changes.

To sum up, India is expected to emerge as a surplus nation in cereals production. Pulses show a deficit of about 5 million tons in 2009-10 and quantum of deficit is expected to increase gradually to the extent of about 14 million tons by 2029-30. With the estimated food-grains production, there is no danger to food security but the estimated production can be achieved mainly through improvement in productivity. A high rate of increase in productivity calls for a priority in agricultural research system
coupled with more capital investment stressing the development of new production technologies for main crops and farm products. Along with plant-based food, there is need for increase in animal-based and aqua-based food through technological changes and protection of environment to support the food-chain process.

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