DEMOGRAPHIC TRANSITON AND HEALTH NUTRITIONAL IN INDIA: AN OVERVIEW

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ABSTRACT

India is a country in the southern part of the Asian continent. With nearly 1.3 billion people, it has the world's second largest population after China. It is the world's largest democracy. It is also the largest country in South Asia by area and the seventh largest in the world. The cost of living will rise exponentially as demand for resources worsens with population growth. The conflict will increase, with cascading social and economic consequences. The objectives of this paper are to examine the growth and trends of population and health nutritional issues in India, and analyze the policy implications of population and health nutritional issues and their consequences in India. The present study based on secondary data covers broadly the period between 1951 to 2021 analyzing growth and trends of population and health nutritional in India. For the analysis, we have estimated the growth rate, mean, correlation, and interpolation of various parameters of population and nutritional health in India. The result shows that India's population has increased from 361.1 million in 1951 to 1345 million in 2021, but the per-capita net availability of food grains has less increased in comparison to population. The value of the correlation coefficient among the population and its influencing factors was found to be mixed and significant at the one percent level of significance in India. Population was discovered to be negatively correlated with per capita water availability, followed by positively correlated with energy consumption and net availability of food grains. Thus, it was found that population is negatively correlated with per capita water availability (r =-985), followed by positively with per capita energy consumption (r =0.967), and per capita net availability of Food grains (r = 0.180). Per capita water availability was negatively correlated with per capita energy consumption (r = -0.937) and per capita net availability of food grains (r = -0.020). Similarly, per capita energy consumption was positively correlated with the per capita net availability of food grains (r = 0.374). The government has initiated several programmes and policies to improve health and nutrition. As a result, there will be a greater need in the future for food availability, employment opportunities, health, and environmental sustainability.

Keywords: *Demographic, Health, Mortality and Nutrition etc*

INTRODUCTION

India is a country in the southern part of the Asian continent. With nearly 1.3 billion people, it has the world's second largest population after China. It is the world's largest democracy. It is also the largest country in South Asia by area and the seventh largest in the world. But demographic changes in India shows in the third phase of the demographic cycle where the death rate and birth rate decline but

the population grows as the birth rate exceeds the death rate. In stage three, countries tend to become more industrialized, which means they are more urbanized, and the total fertility rate tends to decrease. Indian researchers have developed a new way of assessing population and health trends, which is required for robust monitoring of progress in populations and health policies. Typically, population becomes an issue when the current human population exceeds the Earth's carrying capacity. When mortality rates are low and fertility rates are high, this situation occurs (Srinivas Goli and Perianayagam Arokiasamy, 2013). Economists and demographers have viewed the relationship between population growth and economic development with both optimism and pessimism. Most countries have accepted their population as a blessing. While a steadily growing population may appear to be a hindrance to a country's economic development, most people believe it is a positive factor (H.R. Anulavati Menike (2018).

Demographic transition is a term first used by Warren S. Thompson (1929) and Frank W. Note stein (1945) to describe historical trends in births, deaths, and population growth. This process of demographic change began for the most part in the later 18th century. The Theory of Demographic Transition is an attempt to specify general laws governing the size and structure of human populations during industrialization. It is widely accepted as a useful tool for describing a country's demographic history. Aristotle's theory of population evolution describes how society develops from a largely rural, agrarian, illiterate society to a dominant urban, industrial, literate, and modern society. The theory postulates a particular pattern of demographic change from high fertility and high mortality to low fertility and low mortality over time. Demography is comprised of three parts. Demographers attempt to comprehend population dynamics by investigating three major demographic processes: birth, migration, and ageing (including death). All three of these processes influence population changes, such as how people inhabit the earth, form nations and societies, and develop culture Overpopulation poses numerous threats on multiple fronts, including the environment, food insecurity, economic aspects, and other relevant issues. The growing rate of population is the root cause of the increasing burden on natural resources, with overcrowding accounting for more than half of all environmental damage. The damage includes deforestation, indiscriminate wildlife hunting, increased pollution of water and air, excessive waste generation, and so on, resulting in a slew of other issues such as environmental degradation, rising temperatures, climate change, glaciers melting and flooding, and so on.

Intensive farming methods may help feed the world for a time, but overall resource availability is limited. This may lead to famine, malnutrition, starvation, diseases, and general ill health in the long run. The cost of living will rise exponentially as demand for current resources worsens with population growth. Hence, countries with a high population per capita have struggled to contain the communicable virus. Ecological issues such as wildlife extinction and forest fires are just a few examples of how population can affect people's lives. The recent COVID-19 pandemic is also an example. The demographic transition model assumes a strong relationship between birth and death rates, industrialization, and economic growth. In this context, the main objectives of this paper are to examine the growth and trends of population and health nutritional issues in India, and analyze the policy implications of population and health nutritional issues and their consequences in India. The present study covers broadly the period between 1951 to 2021 to analyze growth and trends of population and health nutritional in India. The main sources of secondary data are such as Ministry of Agriculture & Farmers Welfare, Govt. of India, Directorate of Economics and Statistics, DAC & FW, Reserve Bank of India, the United Nations World Population and Census Government of India. This paper analyses the population trends and health nutritional in India by using secondary data. For the analysis, we have estimated the growth rate, mean,

correlation, and interpolation of various parameters of population, health and nutrition's in India.

EMERGING TRENDS OF POPULATION IN INDIA

The percentage change in population from 1951 to 2021 are presented in Table 1. Thus, each decadal year, population growth is increasing in India. When decadal population growth from 1951 to 2021 is compared, we see that 1961 had the highest population growth; after 1971, population growth is slower, but overall population growth continues. Population growth is slower in the 2011 and 2021 decadal years. Thus, this condition depicts that demographic transition stages follow in India, such as the first stage of high population growth potential, second stage of population explosion, third stage of population growth beginning to level off, the fourth stage of stationary population, and the fifth stage of further little population change.

Table 1: Status of Population in India during 1951 to 2021

Census	Population	% Change
1951	361,088,090	13.31
1961	439,234,771	21.64
1971	548,159,652	24.79
1981	683,329,097	24.65
1991	846,421,039	23.86
2001	1,028,737,436	21.53
2011	1,210,854,977	17.7
2021*	1,407,563,842	16.24

Source: Census, Government of India, 1951 to 2011

Food security has been a major concern in India. India has nearly 195 million undernourished people, accounting for one-quarter of the world's hunger burden. India is now ranked 94th out of 107 countries, but it still lags behind countries such as Bangladesh, Pakistan, and Nepal (GHI, 2020). "The State of Food Security and Nutrition in the World, 2018" report, approximately 14.8% of India's population is malnourished.The prevalence of undernourishment in India's total population has decreased from 21.7 percent in 2004-06 to 14 percent in 2017-19. India's total demand for food grains is projected to increase by 2.0 percent per annum. With an increasing population, the growth rate in domestic food grain production needs to accelerate by three to four times (2007). In the case of energy consumption, it found that India's energy use has doubled since 2000, with 80 percent of its energy needs still met by coal, oil and biomass. India is the world's third-largest consumer of energy, but its per capita consumption is less than half that of the world average. In the case of per capita per day, according to the Ministry of Housing and Urban Affairs, the benchmark for urban water supply is 135 liters per capita per day. The Jal Jeevan Mission has set a minimum service delivery level of 55 liters per capita for rural areas, which states may increase to a higher level. Table 2 shows that the population increased from 846 million in 1991 to 1345 million in 2021 while per capita availability of water decreased from 2209 cubic meters in 1991 to 1486 cubic meters in India. On the other hand, per capita energy consumption in India was 2321 mega Jules in 1991 and became 24246 mega Jules in 2021 whereas the per capita net availability of food grains also increased from 186 kg/year in 1991 to 185 kg/year in 2021 in the country. Overall, from the analysis, it is witnessed that per capita water availability depends

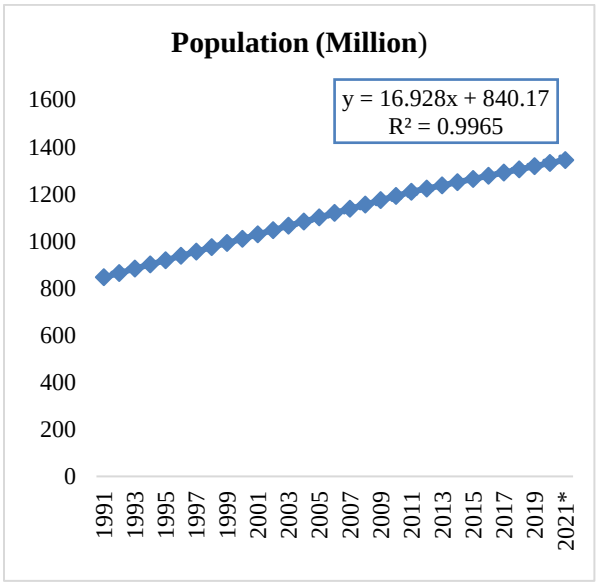
on the population in India. Per capita water availability is declining due to an increasing population, whereas per capita energy consumption and per capita net availability of food grains have increased in India. Figure 1 also shows the trends of population, per capita water availability, per capita energy consumption, and per capita net availability of food grains from 1991 to 2021.

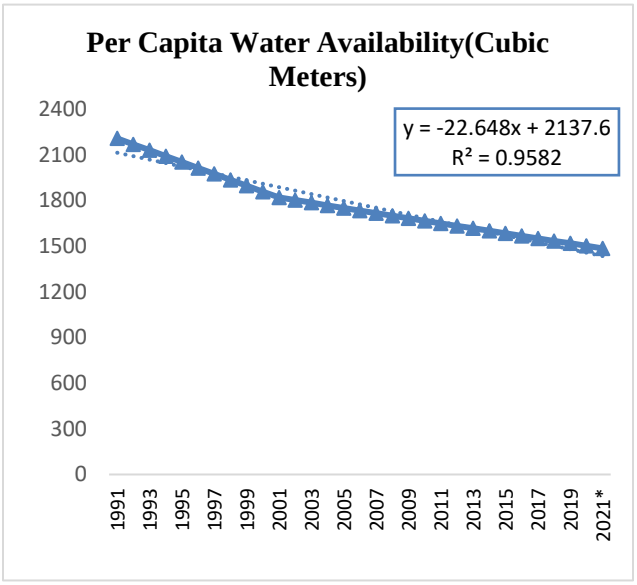
Table 2: Trends of Population, Per Capita Water Availability, Per Capita Energy Consumption and Per Capita Net Availability of food grains in India during 1991 to 2021

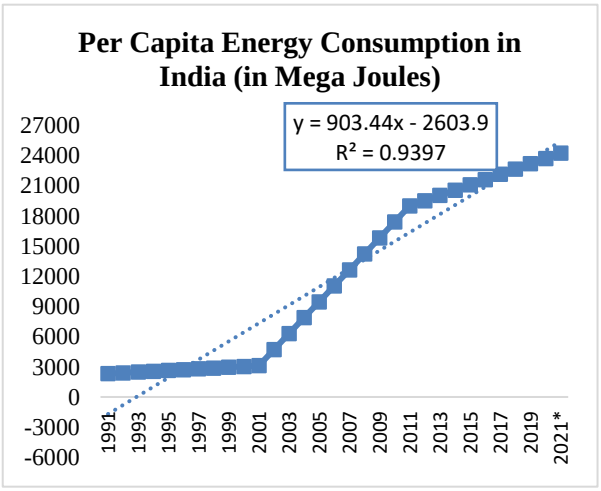
Year		Population (Million)	Per Capita Water Availability (Cubic Meters)	Per Capita Energy Consumption in India (in Mega Joules)	Per Capita Net Availability of Food grains (Kgs. Per Year)
1991		846	2209	2321	186
1992		865	2170	2402	183
1993		883	2131	2483	179
1994		901	2092	2563	176
1995		919	2053	2644	172
1996		938	2015	2725	169
1997		956	1976	2806	166
1998		974	1937	2886	162
1999		992	1898	2967	159
2000		1010	1859	3048	155
2001		1029	1820	3129	152
2002		1047	1803	4715	153
2003		1065	1786	6302	155
2004		1083	1769	7889	156
2005		1101	1752	9476	157
2006		1119	1736	11063	159
2007		1138	1719	12650	160
2008		1156	1702	14237	161
2009		1174	1685	15824	163
2010		1192	1668	17411	164
2011		1210	1651	18998	166
2012		1224	1635	19523	168
2013		1237	1618	20048	170
2014		1251	1602	20572	172
2015		1264	1585	21097	174
2016		1278	1569	21622	176
2017		1291	1552	22147	177
2018		1305	1536	22672	179
2019		1318	1519	23196	181
2020		1332	1503	23721	183
2021*		1345	1486	24246	185

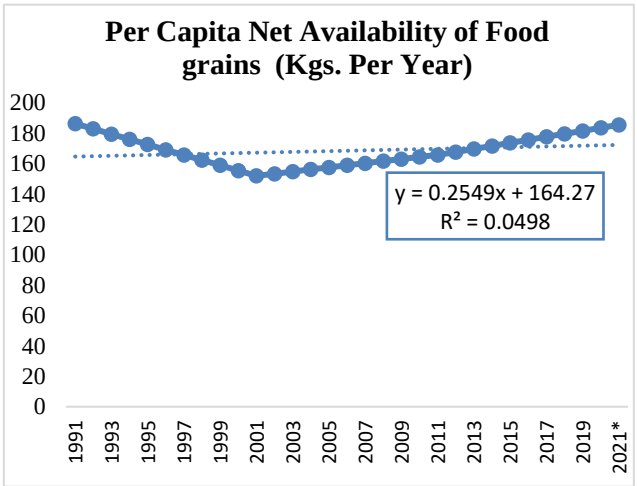
Source: Ministry of Statistics and Programme Implementation, Ministry of Agriculture, Govt. of India

Figure 1: Trends of Population, Per Capita Water Availability, Per Capita Energy Consumption and Per Capita Net Availability of food grains during 1991 to 2021









MATRIX CORRELATION BETWEEN POPULATION AND ITS INDICATORS

The growth of the population in India influenced other factors such as per capita water availability, per capita energy consumption, and per capita net availability of food grains. For the identification of relationships among them, the matrix correlation has been used. Table 3 shows the matrix correlation among population and its influencing factors such as per capita water availability, per capita energy consumption, and per capita net availability of food grains at the national level from 1991 to 2021. Karl Pearson's correlation coefficient technique has been used to find out the relationship. Population was found to be negatively correlated with per capita water availability (r = -9858), positively correlated with per capita energy consumption (r = 0.9677), and negatively correlated with per capita net availability of food grains (r = 0.1802). Per capita water availability was negatively correlated with per capita energy consumption (r = - 0.937) and per capita net availability of food grains (r = - 0.0201).

Similarly, per capita energy consumption was positively correlated with the per capita net availability of food grains (r = 0.3744). The value of the correlation coefficient among the population and its influencing factors was found to be mixed and significant at the one percent level of significance in India.

Table 3: Matrix Correlation of Population and its influencing Factors in India during 1991 to 2021

Variables	Population	Per Capita Water Availability	Per Capita Energy Consumption	Per Capita Net Availability of Food grains
Population	1.000			
Per Capita Water Availability	-0.9858	1.000		
Per Capita Energy Consumption	0.9677	-0.9137	1.000	
Per Capita Net Availability of Food grains	0.1802	-0.0201	0.3744	1.000

Source: Author's Calculation

NUTRITIONAL STATUS

Health and nutrition are the most important enabling factors for human development. The challenges of nutritional problems are exacerbated by population growth and economic change. India today is undergoing impressive economic growth, which has been accompanied by a very slow decline, almost stagnation, in the level of malnutrition. The single greatest scourge facing the developing world today is widespread poverty, which leads to chronic and persistent hunger. The physical manifestation of this constantly re-enacted tragedy is the condition of under nutrition, which affects large sections of the poor, particularly women and children. Under nutrition is a condition caused by a lack of one or more essential nutrients, resulting in a decline in physical growth and health. The inadequacy relates to the food and nutrients required to maintain good health, provide for growth, and allow for a variety of physical activity levels, including work levels, that are socially necessary. As a result, under nutrition reduces work capacity and productivity in adults while increasing mortality and morbidity in children.

Cereals are the most cost-effective source of energy, making them the primary source of nutrition for low-income people. Fruits and vegetables are consumed less frequently in India's general population, despite the fact that a regular intake of these aliments is recognized as an important health promoter, significantly reducing the prevalence of cardiovascular disease and obesity. Animal milk and dairy products are an important part of the Indian diet, and India has unquestionably become one of the world's largest producers of milk and dairy products. Furthermore, diets high in milk, cheese, yoghurt, and other similar products supply important vitamins and minerals required for human growth and development.Constant monitoring of nutrition habits and dietary intake, as well as family and community participation in educational campaigns, ensures healthy, balanced diets and, as a result, a higher quality of life.

TRENDS OF POPULATION AND PER CAPITA AVAILABILITY OF FOOD GRAINS

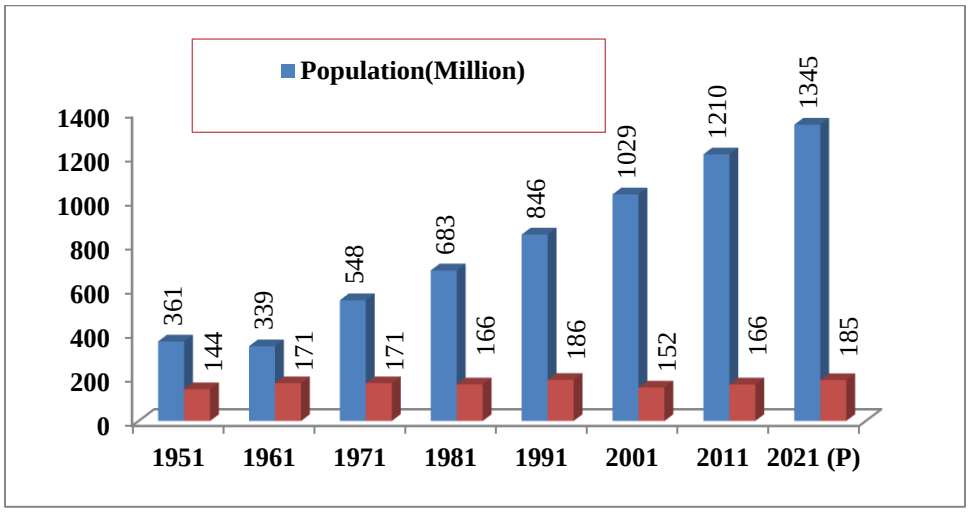
The availability of food and sufficient stocks of food to meet the domestic demand of people in India. Food grain per capita, net availability of food grains and population are very important determinants of food security in India. The trends of population and per capita availability of food (Kgs per year) are presented in Table 4 and Figure 2. It is witnessed that the population has increased from 361.1 million in 1951 to 1345 million in 2021, whereas the per capita net availability of food grains has increased from 141.1 Per Capita Net Availability of Food grains (Kgs. per year) in 1951 to 185 Per Capita Net Availability of Food grains (Kgs. Per Year) at the national level. Overall, from the analysis, it is quite clear that population and per capita net availability of food grains (Kgs. per year) had increased, but the population is seen as higher than per capita net availability of food grains during the study period.

Table 4: Population and Per Capita Net Availability of Food grains per year in India during 1951 to 2021

Year	Population (Million)	Per Capita Net Availability of Food grains (Kgs. Per Year)
1951	361.1	144.1
1961	339.2	171.1
1971	548.2	171.1
1981	683.3	166.0
1991	846.4	186.2
2001	1028.7	151.9
2011	1210.2	165.6
2021 (P)	1345.0	185.4

Source: Ministry of Agriculture & Farmers Welfare, Govt. of India

Figure 2: Per Capita Net Availability of Food grains in India during 1951 to 2021



Source: Ministry of Agriculture & Farmers Welfare, Govt. of India

AVAILABILITY FOOD ARTICLES

During the Green Revolution of the 1960s, due to improved high-yielding varieties of seeds, subsidized inputs, infrastructural development, increased research and extension efforts, and favorable agricultural prices, the production of food grains in the country accelerated, supporting a hike in the per capita availability of food commodities except pulses. An increase in domestic production eliminated dependence on food imports, and India turned out to be a net exporter of food grains. The per capita net availability of food grains (gram per day) of rice, wheat, cereals, pulses, and food grains during 1950–51 to 2016–17 in India is presented in Table 5. The per capita availability of rice increased from 158.90 gram per day in 1950–51 to 221.64 gram per day in 1990–91 and declined to 183.01 gram per day in 2016–17. Similarly, the per capita availability of wheat showed 334.25 gram per day in 1950–51 and reached 182.74 gram per day in 2016–17. Per capita availability of cereals revealed 334.25 gram per day in 1950-51 followed by 468.49 gram per day in 1990-91 and became 433.97 gram per day in 2016-17. The trends of per capita availability of pulses have declined from 60.55 gram per day in 1950-51 to 54.79 gram per day in 2016-17. In contrast, per capita availability of food grain was 394.79 gram per day in 1950-51, increased to 510.14 gram per day, and became 488.77 gram per day in 2016-17. In case of nonfood grains food commodities, per capita availability of milk, fish eggs, fruits and vegetables showed considerable increasing trends in the country. In this context, it is observed that there are extensive variations in per capita availability of food grains and non-food grains commodities at national level. However, increase in the per capita availability of non-food grains commodities has been much higher than food grains during entire study period. Thus, there is need to emphasize on the production of non-food grains commodities such as milk, fish, eggs, fruit and vegetables at national level. India has achieved self-reliance in food grains production but it is facing the challenge of management of huge food grain surplus that accumulates as public buffer stocks.

Table 5: Per Capita Net Availability of Food Commodities in India: 1950-51 to 2016- 17

(Gram/ day)

Year	Rice	Wheat	Other Cereals	Cereals	Pulses	Food grains	Milk	Fish	Eggs	Fruits	Vegetable
1950-51	158.90	65.75	109.59	334.25	60.55	394.79	130	-	0.01	-	-
1960-61	201.10	79.18	119.45	399.73	69.04	468.77	124	0.70	0.02	-	-
1970-71	192.60	103.56	121.37	417.53	51.23	468.80	112	0.90	0.03	-	-
1980-81	197.81	129.59	89.86	417.26	37.53	454.79	128	1.00	0.04	-	-
1990-91	221.64	164.38	80.00	468.49	41.64	510.14	176	1.20	0.07	87	160
2000-01	190.41	135.89	56.16	386.30	29.86	416.16	217	1.50	0.09	133	263
2010-11	181.64	163.56	65.48	410.68	43.01	468.22	281	1.70	0.15	145	302
2014-15	186.00	168.00	77.70	421.40	43.80	465.10	322	1.75	0.18	164	365

2015-16	184.20	199.70	71.60	443.70	43.00	486.80	337	1.87	0.18	171	386
2016-17	183.01	182.74	80.55	434.00	54.79	488.77	355	1.90	0.19	200	378
2017-18	189.70	168.50	83.80	442.00	51.30	493.30	375	2.20	0.21	201	388
2018-19	192.10	177.10	78.20	447.40	47.30	494.70	394	2.36	0.22	202	398
2019-20	197.0	177.70	85.70	464.60	47.90	512.50	406	2.52	0.24	203	408

Source: Directorate of Economics and Statistics, DAC&FW,

The trends of the per capita net availability of certain important articles of consumption in India during 1950–51 to 2015–16 is shown in Table 6. It is found that the per capita net availability of edible oil increased from 2.50 kg in 1950–51 to 17.70 kg in 2015–16, whereas in the case of vanaspati, the per capita availability hovered around 0.98 kg from 1950–51 to 2015–16. Similarly, the per capita availability of sugar (November–October) increased from 5 kg in 1950–51 to 19.40 kg in 2015–16. Between 1980 and 2016, per capita availability of tea increased to around 639 g, while availability of coffee was around 76 g. Overall from the analysis, it is seen that there is remarkable increase in the per capita availability of edible oils, vanaspati, sugar, tea and coffee in the country.

Table 6: Per Capita Net availability of Certain Important Articles of Consumption in India during 1950-51 to 2015-16

Year	Edible Oils (kg.)	Vanaspati (kg.)	Sugar (Nov-Oct) (kg.)	Tea (gm)	Coffee (gm)
1950-51	2.50	0.70	5.00	-	-
1960-61	3.20	0.80	4.80	-	-
1970-71	3.50	1.00	7.40	-	-
1980-81	3.80	1.20	7.30	511.00	79.00
1990-91	5.50	1.00	12.70	612.00	59.00
2000-01	8.20	1.30	15.80	631.00	58.00
2010-11	13.60	1.00	17.00	715.00	90.00
2014-15	18.3	0.80	20.3	752.00	100.00
2015-16	17.70	0.80	19.40	728.00	100.00
2016-17	18.2	0.70	18.90	767.00	100.00
2017-18	19.5	0.70	19.50	830.00	100.00
2018-19	18.1	0.60	19.50	840.00	100.00
2019-20	19.2	0.60	18.80	850.00	100.00

Source: Economic Survey 2017-18, Ministry of Finance, Govt. of India

CONCLUSION AND POLICY IMPLICATIONS

India is facing rapid demographic change for the past few decades. The country has to make serious efforts to enhance the quality of life in all age groups through human capital improvement. Oppositely, over population accounts for more than half of all environmental damage. The cost of living rises exponentially as demand for current resources worsens with population growth. Population growth, along with rapid industrialization and urbanization, has increased demand for already scarce energy (fuel wood, fossil fuel), which leads to environmental degradation. Protein is required for healthy life. Under nutrition is a condition caused by a lack of one or more essential nutrients, resulting in a decline in physical growth and health. India has unquestionably become one of the world's largest producers of milk and dairy products. The availability of food and sufficient stocks of food to meet the domestic demand of people in India.

The growth of population in India influenced other factors such as per capita water availability, per capita energy consumption and per capita net availability of Food grains. The value of the correlation coefficient among the population and its influencing factors is found to be mixed and significant at the one percent level of significance in India. Therefore, it was found that population is negatively correlated with per capita water availability followed by positively with per capita energy consumption and per capita net availability of food grains throughout the study period. The value of slope for population is seen as higher than that for food grains in India. Non-food commodities such as milk, fish, eggs, fruit, and vegetables are scarce, whereas there has been a remarkable increase in the per capita availability of edible oils, vanaspati, sugar, tea, and coffee in the country. The government has introduced many schemes and programmes to recover itself from the clutches of malnutrition and under nutrition but these policies failed to remove inequalities and malnutrition (Global Nutrition Report 2020). But it can be said that with the help of government schemes and programs, health has improved to some extent. Therefore, there is a need to strengthen programmes and policies in the areas of population, education, employment, health, nutrition and poverty in India.

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