

A Study of Nutritional Density and Pressure of Population on Agricultural Land in Nashik District, Maharashtra

Dr. Pralhad Y. Vyalij
Head, Department of Geography
L. V. H. College, Panchavati, Nashik.
Email - pvyalij2010@gmail.com

Abstract: *The present paper, based on the secondary data, intends to measure the population growth, nutritional density, cultivated land per head and population pressure on land in Nashik district. The growth of population in 1991-2001 was higher (+29.52%) than what it was in 2001-11 (22.44%). Nashiktahsil being headquarters as well as a very fascinating tourist place, have shown very high population growth (55.59%) in 1991-2001 but in 2001-2011 it has down up to 33.29% in Nashik tahsil. The nutritional density per hectare right from 1991 to 2011 in the district has increased more (1991 it is 5 and 2011 it is 9). It is also found that cultivated land per head has been noticed in the declining trend, which indicated that population pressure on land has been continuously augmenting. It is suggested here that agricultural productivity needs to be enhanced with the application of advanced technology, using organic manure so that the food grains produced will not cause any harm to people. The expansion of urban centers has also been eating out the fertile agricultural land for non-agricultural purposes in their surrounding areas, which needs to be checked systematically.*

Key Words: *Nutritional Density, Population Pressure, Cultivated Land, Population Growth.*

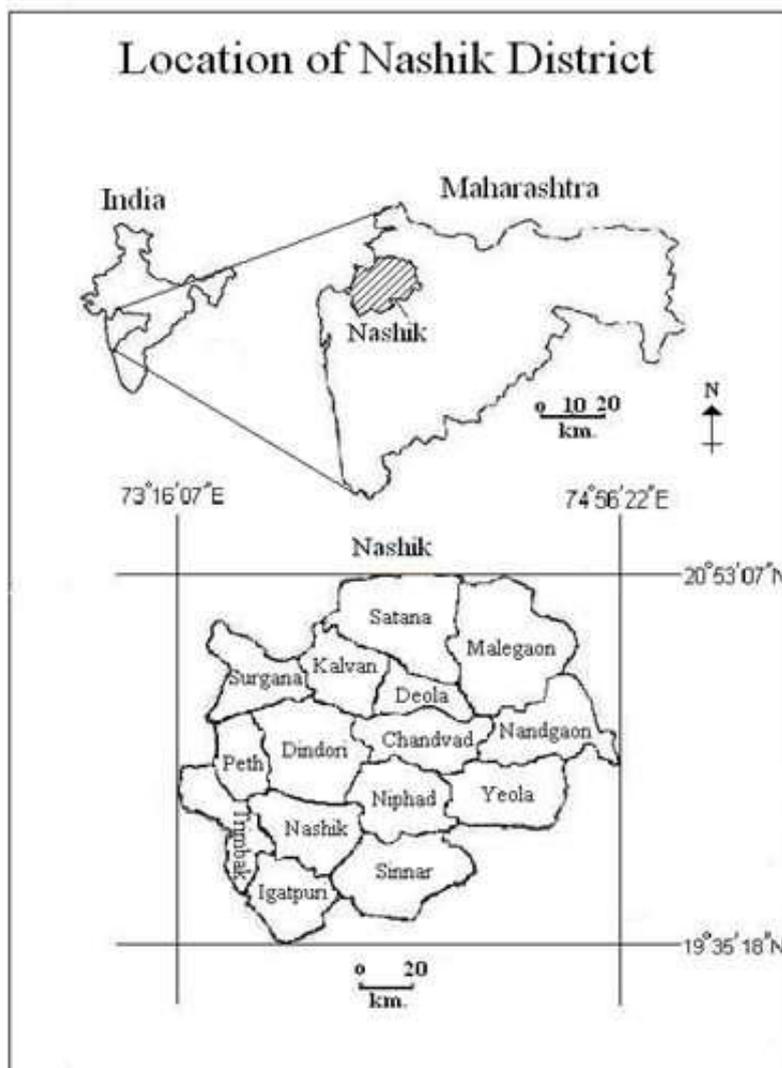
1. INTRODUCTION:

Population is one of the most important problems before the scientists and demographers being an unstable factor. The land resource is fixed and resources produced out of it on the earth have not been ever-increasing in consonant with population growth. They are stable one and continuously exploited by human beings to meet their needs. Thomas Robert Malthus (1798), the famous economist proposed a systematic theory of population in his renowned book, Essay on the Principles of Population, believed strongly that manpower is much stronger than the capacity of the land to sustain such population. When unchecked, population grows geometrically, while the means of sustenance increase in an arithmetical ratio only. In the name of technology, we criticize Malthus theory, but still it has its own importance and implication. You can enhance the agricultural productivity by augmenting land irrigation that may be drip or sprinkle one, using high yield seeds, organic or inorganic manures, tractorization, rainfall harvesting, even artificial rain sometimes somewhere depending upon the situation, all these technological advancements have some limits to growth and crop productivity to feed the ever increasing population. Hence, along with the development of agri-technology, we have to focus on the very basic fact of controlling the population growth especially in the developing countries like India so that from the given land resources we have to feed the population and maintain the minimum standard of living. In the advanced world, various demands for food, house, industries, roads, play grounds, schools, cinema halls, etc. have increased and all these are dependent on land, which has been divided into very small pieces. So a large population has to be dependent on small parts of land, it means every person has very small portion of land. This is resulting serious problem of rapidly increasing population on resources.

Therefore, the main intent of the discourse in the present study is to measure the population growth and its impact on land considering nutritional density and cultivated land per head in Nashik district of Maharashtra state.

2. Study Area :

Nasik is the third largest district of Maharashtra having a total geographical area of 15530 sq. km. This district consists of 15 tahsils, 1919 villages and 25 towns as per the census of 2011. It lies between 19° 35' 18" to 20° 53' 07" North latitude and 73° 16' 07" to 74° 56' 22" East latitudes. Physiographically, Nasik district comprises of a part of a Deccan Plateau, one of the oldest originated blocks of the earth surface. The district may be broadly divided into three geographical regions, viz, a) the downghat konkan tract; b) the Girna basin and c) the Godavari basin.



The soils of the district are essentially derived from the Deccan Trap which is the predominant rock formation of the district. The soil formation is mainly affected by the climatic condition and topography. In the western part of the district (i.e. downghat konkan track) soils have developed under humid conditions, with some laterite soils being observed at higher altitudes of the hills. The soils in Godavari, Kadva and the upper reaches of the Girna and Mosam valley are quite deep and fertile. The soil in the rest of the district is undulating and susceptible to erosion. Light shallow soil is found on hill slopes and very coarse soils at higher elevation. The district is mainly drained by three major rivers, viz. a) River Godavari b) River Girna and c) konkanRivers.

The climate of the district is generally dry except during the south-west monsoon season. The average annual rainfall for the district as a whole is 1035.5mm. Within the district there are considerable variations. The rainfall in general decrease as one proceeds from west to east. Temperature begins to increase rapidly from the latter half of February. May is the hottest month with the mean daily maximum temperature 40.6°C at Malegaon and 37.4°C at Nasik. December is the coldest month with the mean daily minimum temperature 11.3°C at Malegaon and 10.2°C at Nasik. Agriculture is the chief support of the economy of the district and supports the population of 4987923 (2001 census). The total gross cultivated area in Nashik district was 674624 hectares (ha) and gross area under irrigation in 2011-12 was 176871hectares which constitutes 26.21per cent only.Nashik district's Niphad tahsil is highly irrigated (59.73%) followed by Nashik tahsil with irrigation of 51.62and in Yeola tahsil only 34.82per cent. Nandgaon, Sinnar, Malegaon, Peth, Suragana, Trimbak and Igatpuritahsils are comparatively less irrigated as per the Nashik district Land Record office, Annual Report2011-12).

3. Objectives:

- To look into the population growth at tahsil level in Nashik district during 1991-2011.
- To study the tahsil-wise nutritional density in Nashikdistrict.
- To measure the pressure of population on agricultural land in Nashikdistrict.

4. Database and Methodology:

The present study is based on the secondary data, obtained from district census handbook of Nashik, Gazetteer of Nashik and Socio-economic Review of Nashik district. The growth and nutritional density is analyzed and computed by simple statistical methods. To measure the population pressure on cultivated land, relative co-efficient of population is computed by taking into consideration 0.4 hectare land, which is minimum requirement of agricultural land to feed an individual suggested by Swami Nathan (1974) in his book ‘Limits of Growth’ and the following formula is used for calculation of the population pressure index:

$$I = \frac{P1 - P2}{A}$$

Where,

‘I’ is the index of pressure,

‘P1’ is the population size capable of being supported by the resources in a given region or in a country,

‘P2’ is the population size in that region and

‘A’ is a total agricultural area of the country

Tahsil-wise Decadal Growth of Population in Nashik District:

In the last decade of 1991-2001, the population growth rate ranged from a maximum of 55.49 per cent in Nashik tahasil to a lowest of 16.75 per cent in Nandgaon tahsil of Nashik district with average of 29.52 per cent. The high growth rate is noticed in Nashik (55.49%), Suragana (33.03%), Dindori (27.40%), Sinnar (27.19%) and Yeola (25.00%). These tahasil are identified with very high population growth rates i.e. 25 percent and above and recorded their population growth rate close to the district average (29.52%)

Table 1 further reveals that tahsils viz. Peth, Chandwad, Niphad, Malegaon, Igatpuri and Trimbakthe district of medium population growth that varies from 20 to 25 per cent during the 1901-2001. Kalwan (18.57%), Deola (18.18%) and Satana (17.74%) tahsils have recorded their population growth rate below 20 percent.

Table 1: Tahsilwise Growth of Population in Nashik District 1991-2011

Sr. No.	Tahasil	1991	2001	2011	1991-2001	2001-2011
		Population	Population	Population	Growth Rate	Growth Rate
1	Nashik	847000	1317000	1755491	+55.49	+33.29
2	Peth	78000	97000	119838	+24.36	+23.54
3	Dindori	208000	265000	315709	+27.40	+19.13
4	Surgana	109000	145000	175816	+33.03	+21.25
5	Kalwan	140000	166000	208362	+18.57	+25.52
6	Satana	265000	312000	374435	+17.74	+20.01
7	Malegaon	651000	790000	955594	+21.35	+20.96
8	Chandwad	165000	205000	235849	+24.24	+15.05
9	Nandgaon	203000	237000	288848	+16.75	+21.88
10	Yeola	188000	235000	271146	+25.00	+15.38
11	Niphad	357000	437000	493251	+22.41	+12.87
12	Sinner	288000	290000	346390	+27.19	+19.44
13	Igatpuri	188000	228000	253513	+21.28	+11.19
14	Trimbak	113000	136000	168423	+20.35	+17.22
15	Deola	110000	130000	144522	+18.18	+11.17
	Total	3851000	4988000	6107187	+29.52	+22.44

Source: District Census Handbook (1991, 2001, 2011), Gazetteer of Nashik.

In 2001-11, it is very astonishing to note that Nashik (33.29%) tahsil has recorded highest positive population growth rate. Nashik city is a one of the best tourist center in the district as well as in the state. So tourism industry is quite developed and it has a conducive atmosphere so people migrate towards this tahsil. In all there are as many as two tahsils viz. Kalwan (25.52%), and Peth (23.54%) which are identified with high population growth rate near to district population growth rate in 2011.

Other than tahsils like Nandgaon, Surgana, Malegaon, Satana, Sinnar, Dindori, Trimbak, Yeola and Chandwad have recorded their population growth below the district average and the rest of 3 tahsils viz. Niphad, Igatpuri and Deola have shown their growth rate is less than 15 in 2011.

Tahsil-wise Nutritional Density in Nashik District

Nutritional density is another indicator for comprehension of population pressure on land with which the areas with high alarming problem can well be identifies and solution to some extent can be endeavored to sort out. Nutritional density is also known as physiological density. The measure of arithmetic density may be refined by relating the total population, not to the entire territory of a country, but to only the cultivable land that is available, is known as nutritional or physiological density (Bhende and Kanitkar, 2011).The cultivable land is the means of production and it is limited until unless some barren, forest or saline land is made ready for some cultivation and food production can be enhanced through application of advanced and healthy agricultural technology. So nutritional density is the ratio between the regional population and cultivated or arable land, that indicates the pressure of population, is more significant indicator to evaluate the real economic conditions of a region. In short, nutritional density is expressed as man-land ratio between total population and total cultivated area and is expressed in terms of persons per hectares (Ghosh, 2014) or persons per sq. km. This density is calculated using the following formula:

$$\text{Nutritional Density} = \frac{\text{Total Population}}{\text{Land Under Agriculture}}$$

Table 2 reveal the significant facts regarding the nutritional density in Nashik district. In the present study of nutritional density, district has been divided into three categories such as high, moderate and low nutritional density zones for all three time periods. Nutritional density of Satara district as a whole has 5, 6 and 9 persons per ha for 1991, 2001 and 2011 respectively. In comparison to the state of Maharashtra (5 persons per ha) and India (8 person per ha) as well, district Nashik's position is high in 2011.

Table2: Tahsil-wise Nutritional Density in Nashik District (1991 to 2011)

Sr. No.	Tahsils	Nutritional Density per hector		
		1991	2001	2011
1	Nashik	15	61	54
2	Peth	2	4	6
3	Dindori	3	4	8
4	Surgana	3	5	6
5	Kalwan	3	4	5
6	Satana	3	4	5
7	Malegaon	6	7	11
8	Chandwad	3	3	4
9	Nandgaon	3	4	22
10	Yeola	3	3	3
11	Niphad	5	6	7
12	Sinner	3	4	5
13	Igatpuri	3	4	20
14	Trimbak	-	4	6
15	Deola	-	3	5
	Total	5	6	9

Source: District Census Handbook 1991, 2001, 2011.

- **Low Density Zone (up to 3 person per sq.ha)**

The case in hand is the Nashik district for which it has been computed at tahsil level wherein it is found that the low density up to 3 persons per hectare was in 10 tahsils viz. Peth, Dindori, Surgana, Kalwan, Satana, Chandwad, Nandgaon, Yeola, Sinnar and Igatpuri in 1991. In 2001 the number has come down to 3 and all are same where the nutritional density has slightly augmented from 3 to 4 and similarly in 2011 the tahsils' number with low density reached only one i.e. Yeola.

● **Moderate Density Zone (3 to 6 persons perha)**

The tahsils with moderate nutritional density of 3-6 persons per hectare in 1991 were Niphad (5) and Malegaon (6). In 2001 also the number of tahsils with moderate density is increased, excluding Deola, Yeola, Chandwad, Malegaon and Nashik tahsils. Medium nutritional density from 2001 to 2011 are Peth, Surgana, Kalwan, Satana, Chandwad, Niphad, Sinnar, Trimbak and Deola of the district. This is because of the fact of internal changes and migration.

● **High Density Zone (above 6 perha)**

The only tehsil namely Nashik has been identified with highest nutritional density of 15, 61 and 54 persons per hectare in 1991, 2001 and 2011 respectively. Its density has increased in 2001 because of decrease in agricultural land and low growth in population. Malegaon tahsil shows high density in 2001, while in 2011 there is total six tahsils crossed high density level viz Nashik, Nandgaon, Igatpuri Malegaon, Dindori and Niphad, nutritional density has changed depending upon the increase or decrease in population and agricultural land during this period.

Population Pressure on Agricultural Land

Table 3 exhibits availability of cultivated land per head in each tahsil in Nashik district. In the district as a whole population has increased from 38.51 lakh in 1991 to 49.88 lakh in 2001 and to 61.07 lakh in 2011. But in relation to population, availability of cultivated area per head has declined from 0.22 ha in 1991 to 0.17 ha in 2001 and 0.11 hectare in 2011. It is quite less than Maharashtra (0.20 ha) and India as a whole (0.12 ha). As compare to the district average, only Peth tahsil (0.45 ha) is identified with more than minimum requirement of cultivated land of 0.4 hectare in 1991. Other than Peth tahsil in 1991 (0.45 ha) remaining all tahsils in the district having per head cultivated land below the minimum requirement (Table3).

Table 3: Area under Cultivation per Head in Hectare in Nashik District 1991-2011

Sr. No.	Tahsils	Area Under Cultivation		
		1991	2001	2011
1	Nashik	0.06	0.02	0.02
2	Peth	0.45	0.23	0.18
3	Dindori	0.35	0.27	0.13
4	Surgana	0.30	0.22	0.17
5	Kalwan	0.35	0.22	0.19
6	Satana	0.33	0.23	0.18
7	Malegaon	0.17	0.13	0.09
8	Chandwad	0.36	0.32	0.23
9	Nandgaon	0.30	0.22	0.05
10	Yeola	0.38	0.31	0.31
11	Niphad	0.20	0.17	0.14
12	Sinner	0.32	0.27	0.19
13	Igatpuri	0.30	0.22	0.05
14	Trimbak	-	0.27	0.16
15	Deola	-	0.32	0.20
	Total	0.22	0.17	0.11

Source: Socio- economic Abstract of Satara District 1991, 2001 and 2011

The population pressure index in relation to the area under cultivation has also been calculated at tahsil level in Nashik district for the better understanding of population pressure (see Table 4). District Nashik’s population pressure index has gradually increased from -3.63, -4.2 and -4.74 in 1991, 2001 and 2011 respectively. Not only in the district, it’s each and every tahsil has shown the increasing trend of population pressure from 1991, 2001 and 2011.

Table 4: Population Pressure Index in Relation to Land under Cultivation in Nashik District.1991-2011

Sr. No.	Tahsils	Population Pressure Index		
		1991	2001	2011
1	Nashik	-3.50	-4.38	-6.45

2	Peth	-4.40	-5.84	-8.87
3	Dindori	-4.24	-5.64	-9.47
4	Surgana	-4.36	-5.78	-8.79
5	Kalwan	-4.32	-5.76	-8.74
6	Satana	-4.18	-5.58	-8.50
7	Malegaon	-3.73	-5.01	-7.64
8	Chandwad	-4.29	-5.71	-8.70
9	Nandgaon	-4.25	-5.67	-8.62
10	Yeola	-4.27	-5.67	-8.65
11	Niphad	-4.07	-5.43	-8.32
12	Sinner	-4.15	-5.61	-8.54
13	Igatpuri	-4.27	-5.68	-8.68
14	Trimbak	-	-5.79	-8.80
15	Deola	-	-5.80	-8.84
	Total	-3.63	-4.20	-4.74

5. CONCLUSION:

It is inferred that in Nashik district population growth has declined in 2001- 2011 from 1991-2001. With the increasing population the availability of cultivated land per head has declined in the district as a whole as well as in each tahsil. Due to reduction in land under cultivation population pressure has increased. The highest growth rate was registered in Nashik tahsil. The agricultural land in Nashik is comparatively far less being a hilly tourist area. Whatever little land is available for cultivation, is mainly used for growing of fruit orchards and vegetables. The area of this tahsil is quite less in the district. So per capita availability of agricultural land is low and it is lowest in the entire district. Due to low availability of land, population pressure index is recorded highest in Dindori (-9.47) tahsil in the district. Lowest population pressure index is recorded in Nashik and Malegaon tahsils, because of reliable proportion of man and land ratio. Population pressure index recorded above -8.00 in all tahsils except Malegaon and Nashik in 2011.

To reduce the population pressure, there is need to have a control over the growth of population by improving their overall socio-economic condition. When the people are well educated and economically better, having accessibility to the basic needs and maintenance of good health, it will certainly bring down the pressure on land as well as on life supporting infrastructural facilities. Advance technology has to be brought into practice to increase the agricultural productivity. It may be irrigation, better seeds and healthy cultivation of crops and vegetables for having the healthy society.

REFERENCES:

1. Bhende, Asha and Kanitkar Tara, (2011): *Principles of Population Studies*, Himalaya Publication House, Mumbai.
2. Chandna, R. C., (2009): *Geography of Population*, Kalyani Publishers, New Delhi.
3. District Census Handbook, Nashik, 1991, 2001 and 2011.
4. Gautam, A., (2012), *Agricultural Geography*, Sharda Pustak Bhavan, Allahabad.
5. Gautam, Alka and Rastogi, Sonal (2003) : *Economic Geography*, International Publishing House, Meerut City (India)
6. Hammond, C. W., (1985): *Elements of Human Geography*, George Allen and Unwin, London.
7. Husain, M.: (2010), *Agricultural Geography*, Rawat Publications, Jaipur.
8. Kashyap, Arpana, (2011), *Population Pressure and Responses in Relation to Agricultural Potentials : A Study in Almora District*, Ph. D. Thesis Submitted to Kumaon University, Nanital.
9. Lal, Tarsem, (2011), *Population Pressure and Changes in Land Use Pattern : A Study of Akhnoor Tehsil*, Ph. D. Thesis Submitted to University of Jammu.
10. Malthus, Thomas Robert (1798): *Essay on The Principles of Population*, J. Johnson, London.
11. Singh, J. and Dhillon, S., (1987), *Agricultural Geography*, Tata Mc-Grow Hill Publishing Company Ltd., New Delhi.
12. Swaminathan, M. S., (1974): *Every Man's Science*, ISCA, Vol. IX, No., 2, pp.47-50.