

POPULATION CHARACTERISTICS AND POPULATION PROJECTION OF SATARA DISTRICT: A GEOGRAPHICAL STUDY

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Article Info	ABSTRACT
Article History: Received: 15th Dec 2025 Accepted: 19th Dec 2025 Published: 20th Dec 2025	The study of demographic characteristics and population projection helps us to understand the population situation of a geographical region. It is a useful tool for planners to anticipate the future size and composition of population. We cannot see into the future, but population projection is helpful to think about a range of scenarios based on assumptions. It assists demographers in anticipating future challenges and opportunities in various sectors. Urbanization, migration, fertility, mortality and socio-economic change are the main factors behind demographic shifts in Satara district. This research paper aims to analyze the demographic characteristics in Satara district and project population growth for 2021 and 2031. Population of the study region is 3.40 % of the total population of Maharashtra. It ranks 9th in terms of population among the districts of Maharashtra. Population density of Satara district is 287 per Sq. Km. Density pattern of population indicates that Karad and Satara tehsils have higher density. Projected population, population growth and density for the Satara district for the years 2021 and 2031 is calculated with average of three methods namely Arithmetic Increase Method, Incremental Increase Method and Geometrical Increase Method. District shows a positive demographic trend, with the population expected to increase from around 3272600 in 2021 to 3630200 in 2031.
Keywords: Arithmetic Increase Method, Incremental Increase Method, Projected population	
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1. INTRODUCTION:

In settlement research population study is the most important aspect. The study of demographic characteristics and population projection helps us to understand the population situation of a geographical region. Population projection is a very important tool for government and private planners for planning, policy formation and infrastructure development. Population projection is mathematical extrapolations of current trends and assumptions about the future. With the help of it demographers forecast future population scenarios based on historical and current data. It assists them in anticipating future challenges and opportunities in various sectors.

Due to demographic shifts in recent decades it is important to understand the future population dynamics of Satara district. Urbanization, migration, fertility, mortality and socio-economic change are the main factors behind demographic shifts in Satara district. With various statistical techniques and models the present study provides reliable population forecasts for study region that can guide government and private planners for planning, policy formation and infrastructure development. In present research attempts are made to find out population characteristics and bridge the gap between population data and strategic planning for balanced and sustainable development of Satara district.

2. STUDY AREA:

Satara district holds significant cultural, historical and economic importance. District located at Western part of the Deccan plateau in southern Maharashtra. The district lies between 17° 5' to 18° 11' north latitude and 73° 33' to 74° 54' east longitude.

3. OBJECTIVES:

The major objectives of the present study are:

1. To study the demographic characteristics of Satara district.
2. To find out population projection for 2021 and 2031 decades for study region.

4. DATABASE AND METHODOLOGY:

The present study is based on a secondary source of data mainly collected from District Census Handbooks of Satara District during 1991, 2001 and 2011 decades. Maps were created with the help of QGIS Software.

In the present study demographic characteristics are studied with the help of various mathematical techniques. The population growth rate has been computed by employing the following formula:

$$\text{Population Growth Rate} = \frac{P_n - P_0}{P_0} \times 100$$

Where, P_n = Population of next decade P_0 = Population of base decade.

Population density is calculated by dividing the total population of the region by the total area of the region. Sex ratio refers simply to the number of females per thousand males. Literacy rate is calculated by dividing the total literate population of the age group 7 years and above by the total population of the same age group. To assess the trends of population projections, following three mathematical methods are used.

a. Arithmetic Progression Method:

$$P_n = P + nI$$

Where,

P_n = Population of year to be calculated, P = Last known population

n = No of decades, I = Average increase in population

b. Incremental Increase Method:

$$P_n = P + nI + n\left(\frac{n+1}{2}\right)y$$

Where,

P_n = Population of year to be calculated, P = Last known population

n = No of decades I = Average increase in population

y = Average incremental increase in population

c. Geometrical Increase Method:

$$P_n = P \left(1 + \frac{r}{100}\right)^{1/n}$$

Where,

P_n = Population of year to be calculated, P = Last known population

r = Geometric mean n = No of decades

Geometric mean (r) = $(r_1 \times r_2 \times r_3 \times \dots \times r_n)^{1/n}$

The average of figures arrived from these three methods were considered to finalize the projected population for year 2021 and 2031. The result has been shown with the help of different maps and tables.

5. RESULT AND DISCUSSION:

In this research paper demographic characteristics of the study area during 2011 and population projections for the year 2021 and 2031 are studied with following points.

5.1 DEMOGRAPHIC CHARACTERISTICS:

Distribution, growth, density and sex ratio etc. characteristics of population influence the settlement of the study area. The population characteristics of the Satara district are shown in table 1.1.

According to the 2011 census the population of the study region is 3.40 % of the total population of Maharashtra. It ranks 9th in terms of population among the districts of Maharashtra. The population growth rate of Satara district was 6.93 percent during the 2001 to 2011 census period. It is high in Mahabaleshwar, Khandala, Man and Satara tehsil and low in Jaoli, Patan and Koregaon tehsil.

The population density of Satara district is 287 per Sq. Km. Density pattern of population indicates that Karad and Satara tehsils have higher density. On the other hand Man, Mahabaleshwar, and Jaoli tehsils have lower population density. Man tehsil has the lowest density of 152 persons per sq. km. On the other hand Karad tehsil has the highest density of 501 persons per sq. km.

Table: 1.1
Satara District: Population Characteristics, 2011

Sr. No	Tehsils	Growth Rate 2001 - 2011	Density (per sq.km)	Literacy rate	Sex Ratio	Work Participation Rate
1	Satara	11.1	551	88.72	976	40.19
2	Wai	5.77	321	85.09	1005	45.67
3	Khandala	14.69	263	85.4	947	46.4
4	Koregaon	1.73	282	85.13	999	44.99
5	Phaltan	9.26	292	81.16	944	46.14
6	Man	13.04	152	72.55	976	50.79
7	Khatav	5.49	202	80.52	1012	48.43
8	Karad	7.48	562	84.31	972	42.94
9	Patan	0.47	216	77.4	1065	47.98
10	Jaoli	-14.52	179	81.96	1068	48.13
11	Mahabaleshwar	33.52	155	83.91	937	40.9
12	District	6.93	287	82.87	988	45.11

Source: Based on District Census Handbook, Satara District, 20011

Sex ratio is an important social indicator that measures the equality between male and female. According to the 2011 census the average sex ratio of the study region was 988. The sex ratio of Satara district is higher than the state. Jaoli (1068) has the highest sex ratio in the study region. On the other hand Mahabaleshwar (937) has the lowest sex ratio.

The Hindu population is higher in the study region (89.62 %). The rest of the communities are Muslims 4.89 percent, Buddhists 4.70 per cent, Jain 0.43 percent, Christians 0.15 percent, Sikhs 0.04 percent and others 0.17 percent.

Satara district reported 82.87 percent literacy rate in the 2011 census. The literacy rate of Satara, Wai, Khandala, Koregaon, Karad, and Mahabaleshwar tehsils are above the district average. While Jaoli, Man, Patan, Khatav and Phaltan tehsils have literacy rate below the district average. Satara tehsil (88.72) has the highest rate in the study region. On the other hand, Man (72.55) had a lower literacy rate during the 2011 census period.

Work participation means the proportion of main workers to the total population. The work participation rate of the study region is 45.11 % which is highest in Man tehsil and lowest in Satara tehsil. Tehsils like Satara, Mahabaleshwar and Karad work participation rate is below 44 %. Man, Khatav and Jaoli tehsils Work participation rate is above 48 %.

5.2 POPULATION PROJECTION

Table 1.2 represents projected population, population growth and density for the Satara district for the years 2021 and 2031 which is calculated with average of three

methods namely Arithmetic Increase Method, Incremental Increase Method and Geometrical Increase Method. Table highlights projected population numbers and their respective growth rates and density across the eleven tehsils of the district. According to the table Satara district shows a positive demographic trend, with the population expected to increase from around 3272600 in 2021 to 3630200 in 2031 (Fig.1). District shows growth rate of about 10.93% over the decade. Population density of the district is projected to rise from 312 to 346 persons per sq. km.

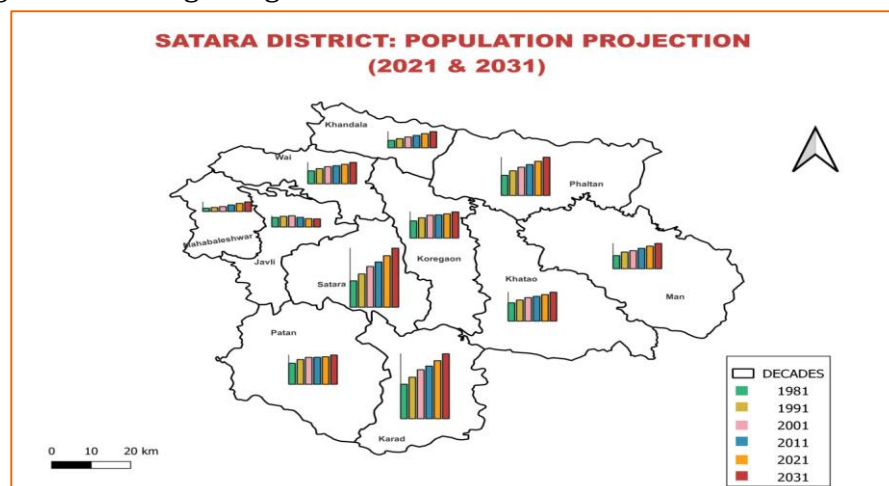
Table: 1.2

**Satara District: Population Projection, Population Growth and Density-
2021 & 2031.**

Tahsils	Population Projection		2021		2031	
	2021	2031	Growth	Density	Growth	Density
Satara	571144	654759	13.76	627	14.64	719
Wai	215723	236423	7.72	346	9.6	379
Khandala	157663	179749	14.73	302	14.01	344
Koregaon	268623	290212	4.32	295	8.04	318
Phaltan	378707	423920	10.52	323	11.94	362
Man	249803	279909	10.71	168	12.05	189
Khatav	294775	320898	7.08	216	8.86	235
Karad	643874	719681	10.24	620	11.77	693
Patan	305191	324250	1.9	220	6.24	234
Jaoli	92983	90076	-12.7	156	-3.13	151
Mahabaleshwar	90522	106382	24.29	192	17.52	226
District	3272608	3630249	8.95	312	10.93	346

Source: Based on District Census Handbook, Satara District, 20011

Satara and Karad tehsils will emerge as the densely populated areas, with high and steady growth in population and density. Satara tahsil, in particular, is expected to have the highest density by 2031, reaching 719 persons per sq. km. Due to urban centres, better infrastructure and economic opportunities Satara and Karad tahsil could become densely populated tehsil. Phaltan and Khandala also show significant growth. Khandala maintaining one of the highest growth rates across both decades.

**Fig. 1**

Mahabaleshwar tehsil show high population growth 24.29% and 17.52% in 2021 and 2031 respectively. Jaoli tehsil will has negative population growth as well as lowest population density in both decades. This unusual high population growth in Mahabaleshwar and negative population growth in Jaoli is due to shifting of 56 villages from Jaoli to Mahabaleshwar tehsil during 2001. Due to this result of population projection is not applicable for Jaoli and Mahabaleshwar tehsil. Tehsils like Wai, Khatav, Man, and Koregaon show moderate but steady growth in population and density.

6. CONCLUSION:

The population growth rate of Satara district was 6.93 percent during the 2001 to 2011 census period. Density pattern of population indicates that Karad and Satara tehsils have higher density. The sex ratio of Satara district is higher than the state. The literacy rate of Satara, Wai, Khandala, Koregaon, Karad, and Mahabaleshwar tehsils are above the district average. Satara district shows a positive demographic trend, with the population expected to increase from around 3272600 in 2021 to 3630200 in 2031. Satara and Karad tehsils will emerge as the densely populated areas, with high and steady growth in population and density. Due to urban centre, better infrastructure and economic opportunities Satara and Karad tahsil could be become densely populated tehsil.

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