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ORIGINAL ARTICLE

SPATIAL PATTERNS OF POPULATION DENSITY IN KONKAN REGION OF MAHARASHTRA

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ABSTRACT

Over twelve billion people inhabit the world. These are unevenly distributed over the globe. Geographers have been interested in the uneven spatial patterns over different world regions. Distribution of population is measured by adopting various measures of central tendency like percentage, ratio and index. Spatial patterns of population density and its types are analysed in the Konkan region of Maharashtra, by using the secondary data sources. This is expressed tehsil wise for the year 2011 by considering the relationship between population and land area, implementingfour types of densities measures. The result obtained is shown with the help of diagrams. Variations in population distribution are caused by natural and anthropogenic factors like physiography, climate, accessibility, water availability, soil, transportation facilities, economic activities and socio-cultural development factors.

KEYWORDS: Population distribution, Physiological density, Agricultural density, Nutritional Density, Lorenz curve.

INTRODUCTION

Each element on the Earth's surface is organized in space in a specific pattern. This arrangement of objects across surface isconsidered by countering why people and activities are distributed across space as they are, by recognizing the location of important places and explaining why human activities are located besides one another in space. Maps are used as a method of depicting the distribution of features and as a tool for explaining observed patterns. The arrangement of a feature in space is known as distribution. Density, concentration and pattern are the three main identified properties of distribution across the Earth. The frequency with which something occurs in space is its density. The number of people occupying an area of land can be computed in several ways. The most commonly used measure of density to compare the distribution of population in different countries is the *arithmetic* density, which is the total number of

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objects in an area. It involves two measures, the number of people and the land area. Depending on the theme being studied, density can be measured in other ways, i.e., *physiological* density, which is the number of persons per unit of area suitable for agriculture.*Agricultural* density is the number of farmers per unit area of farmland. *Housing* density is the number of dwelling units per unit of area and so on. This paper presets the tehsil wise analysis of arithmetic, physiological, agricultural and nutritional densities for the census year 2011, by using Lorenz curve and the obtained result is shown by scatter diagram.

STUDY REGION

Maharashtra's Konkan division is selected as the area of study. It consists of six districts, including, Mumbai, Mumbai Suburban, Thane, Raigarh, Ratnagiri and Sindhudurg, from north to south, as per Census of India, 2011. Latitudinal extent of Konkan region is between 15^0 5' to 20^0 2' North latitudes and 72^0 8' to 74^0 2' East longitudes, as shown in **Map. 1**. It covers an area of 30,746 sq. kms, with 720 kms. coastline adjoining the Arabian Sea on its west, andis made up of 47 tehsils. Most of the population are engaged in farming and fishing activities. Out of the total population, 22.03 percent reside in rural areas and the remaining77.96 are urban residents. The proportion of males and females is 15103807 and 13497634 respectively. The region has an average child population of 10.69 percent.
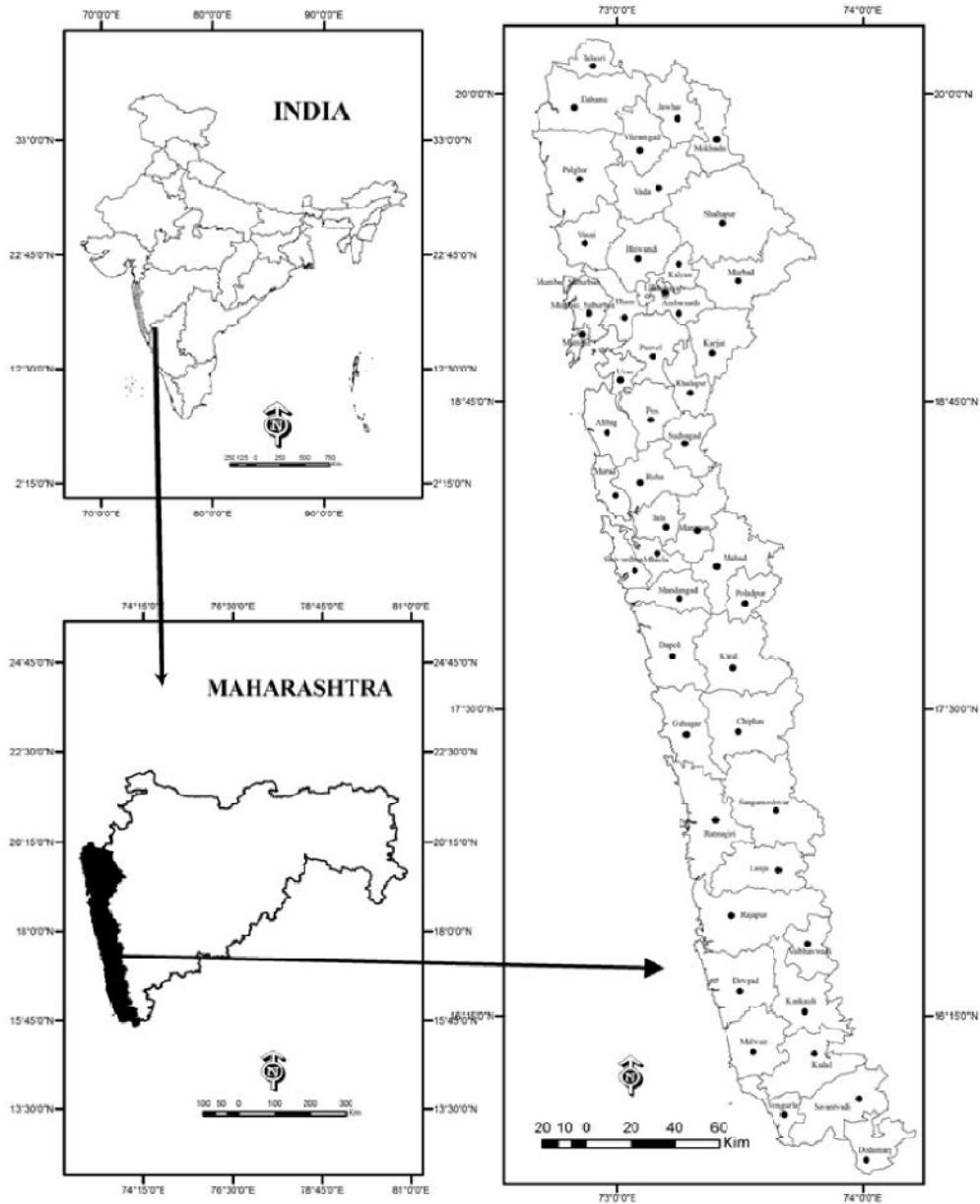
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Fig. 1: Location of the study area

OBJECTIVES
       The main objective of this paper is to examine the relationship between total population and area, total population and habitable area, total population and cultivated area and agricultural population and cultivated area in all the 47 tehsils.

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DATA SOURCE & METHODOLOGY

To fulfill the above-mentioned objectives, data published by the Census of India, 2011 is used. This data is analysed statistically by using ratio, percentage and analyzed by drawing Lorenz curve, the result obtained is shown by scatter diagram.

POPULATION DISTRIBUTION

The proportion of population in the entire study region according to the Census of India 2011 is28601441, of which 15103807 are males and 13497634 are females. Tehsil wise analysis of total population reveals variation, it is highest in Mumbai Suburban (32.72 percent) followed by Thane (13.24 percent), Mumbai (10.79 percent), Kalyan (5.47 percent) and lowest in Tala (0.14 percent), Vaibhavwadi (0.15 percent), Poladpur (0.16 percent) andDodamarg (0.17 percent). Dahanu (5.36 percent), Palghar (5.15 percent), Kalyan (4.49 percent),Bhiwandi (4.40 perent) tehsils shows highest rural population and lowest is found inThane (0.25 percent),Poladpur (0.63 percent), Tala (0.64 percent) andVaibhavwadi (0.70 percent) tehsils during2011.Mumbai Suburban (41.96 percent), Thane (16.91 percent), Mumbai (13.84 percent), Kalyan (5.75 percent), Vasai (5.52 percent) tehsils shows greater urban population whileGuhagar (0.01 percent), Poladpur (0.03 percent), Vikramgad (0.03 percent) and Sudhagad (0.04 percent) tehsils shows lowest urban population.

POPULATION DENSITY

Density is one of the ways by which population distribution can be measured. It is an expression of the degree to which population is clustered within a given area and is expressed as persons per square kilometer area (Rubenstein, 2002). Based on the objectives of study, density measures are of different types, but the most commonly used densities are crude or arithmetic density, specific density, physiological density and agricultural density.

ARITHMETIC DENSITY

It is the total number of objects in an area. It involves two measures, the total number of people and the land area. Arithmetic density enables researchers to make appropriate comparisons of the number of people trying to live on a given piece of land in different regions of the world. The study region recorded an overall average density of 3894 persons per square kilometer area.Dodamarg, Vaibhavvadi, Poladpur, Sudhagad and Rajapur tehsils have recorded lower arithmeticdensity, while at the other end lie the tehsils of Bhiwandi, Ambarnath, Vasai, Kalyan and Thane.As is visible in Figure 2(a), The gap between the line of equity and the Lorenz curve is much larger, indicating more unequal distribution of population. Compared to the land area, the population living in Vasai, Thane, Bhiwandi, Kalyan, Ulhasnagar, Ambarnath, Panvel, Mumbai and Mumbai Suburban tehsils is very large. About 5 percent of the population reside in approximately 10 percent of land, in the first quantile, indicating about 95 percent of population occupy nearly 90 percent of total land. In the next stage, almost 13 percent of the population occupy 40 percent of area, indicating that in totality 8 percent are actually present on 30

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percent of area. Further, 21 percent people are living on 60 percent of the region, which in reality reveals 8 percent on 20 percent of the study area. Lastly, 67 percent of population occupying 95 percent area means 46 percent of population resides on 35 percent of the region's land area.

PHYSIOLOGICAL DENSITY

A more meaningful population measure is afforded by looking at the number of people per area of a certain type of land in a region. Land suited for agriculture is called the arable land. In a region, the number of people supported by a unit of arable land area is called the physiological density, which averages to about 215 in the Konkan region of Maharashtra. Among the tehsils, physiological density was low in Vaibhavvadi, Mokhada, Murbad, Mandangad and Kankavli; while it was high in Ambarnath, Panvel, Kalyan, Vasai and Thane of Konkan region of Maharashtra state. Wider gap between the line of equity and the Lorenz curve reveals extreme proportion of discrepancy between total population and the total cultivated area. Biggest difference is found in Vasai, Thane, Bhiwandi, Kalyan, Ulhasnagar, Ambarnath, Panvel, Karjat, Khalapur, Mumbai and Mumbai Suburban tehsils. As seen in (Fig.2(b)), approximately, 5 percent of population in the area under study is occupying about 9 percent of the land, which means that in reality, 95 percent population is actually settled on 91 percent of the land .

The residents of Ambarnath, Panvel, Kalyan, Vasai and Thane tehsils exerts greater pressure on the land to produce enough food on the lesser amount of available land.

AGRICULTURAL DENSITY

Agricultural density is the ratio of the number of farmers to the amount of arable land; it helps account for economic differences. Konkan region recorded an average of 215 agricultural density. Figure 2(c). Lowproportion of farmers per arable land was recorded in Vaibhavvadi, Sawantwadi, Kankavli, Ambarnath and Dodamarg tehsils, may be because technologyand finance allow few people to farm extensive land areas and feed many people, freeing most of the population to work in offices, factories or shops rather than in the fields; while it was high inKarjat, Sangameshwar, Vasai, Vikramgad and Tala.Overall inequality between agricultural density and cultivated area is less in the study region. The proportion of both in Mokada tehsil is same; still tehsils like Talasari, Dahanu, Vikramgad, Jawhar, Vada, Vasai, Panvel, Karjat, Khalapur, Pen, Alibag, Roha, Sudhagad, Mangaon, Tala, Shrivardhan, Mhasla, Poladpur, Khed, Chiplun, Guhagar, Sangameshwar, Lanja and Rajapur have slightly more proportion of population in comparison with the cultivated area.

The physiological density of Thane, Vasai, Kalyan, Panvel and Ambarnath is high, indicating these tehsils put heavy pressure on the land to produce food; but Ambarnath, thane, Kankavvali, Dodamarg, Vaibhavvadi, and Mandangad have a much lower agricultural density, indicating that the more efficient agricultural systems in these tehsils require fewer farmers.Vaibhavvadi, Sawantwadi, Kankavli, Ambarnath and Dodamarg

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tehsils have limited arable land; but highly efficient farmers in theses tehsils generate large food supply from limited resources.

NUTRITIONAL DENSITY

Relationship between total rural population and total cropped area is the nutritional density or is also referred to as the man-crop density (Singh, 1984). The study region recorded average of 1795 rural persons per cropped area. Kalyan, Ambarnath, Uran, Guhagar and Ratnagiri tehsils are among the top with greater nutritional density; while Vaibhavvadi, Sawantwadi, Kudal, Sudhagad and Kankavli are the tehsils with lowest density, along with the urban tehsils of Mumbai, Mumbai Suburban and Ulhasnagar. It is evident from figure 2(d) that the gap between the line of equity and Lorenz curve is less, indicating least inequality between rural population and total cropped area. Up to the first forty percent, the gap between the line of equity and Lorenz curve is very much smaller; it continues to increase slightly, but overall the difference is not much.

CONCLUSION

The residents of Ambarnath, Panvel, Kalyan, Vasai and Thane tehsils exerts greater pressure on the land to produce enough food on the lesser amount of available land.The large difference in physiological density demonstrates that crops grown on one square kilometre of land in Thane, Vasai and Kalyan must feed far more people than in other tehsils. The pressure placed by people on the land to produce enough food in these tehsils is superior.Ulhasnagar, Mumbai and Mumbai Suburban tehsils are more developed technologically and financially, thus allowing more people to work in factories, offices or shops, rather than in the fields.Vaibhavvadi, Sawantwadi, Kankavli, Ambarnath and Dodamarg tehsils generate large food supply from limited resources.

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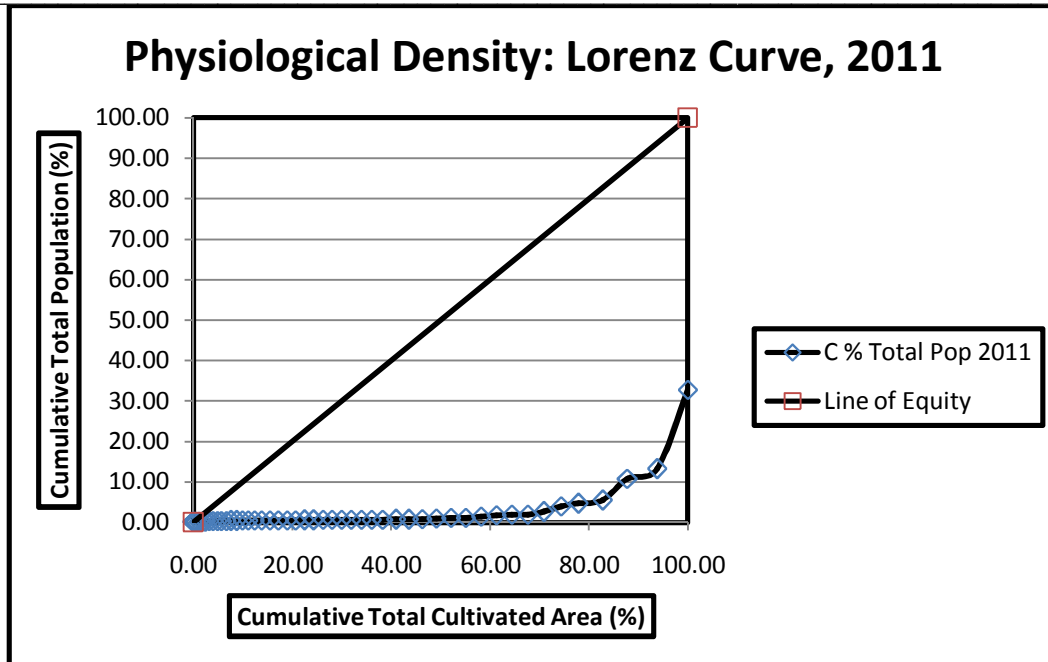7. Socio- Economic Review and Statistical Abstract (2011): District Ratnagiri, Raigarh, Thane and Sindhudurg

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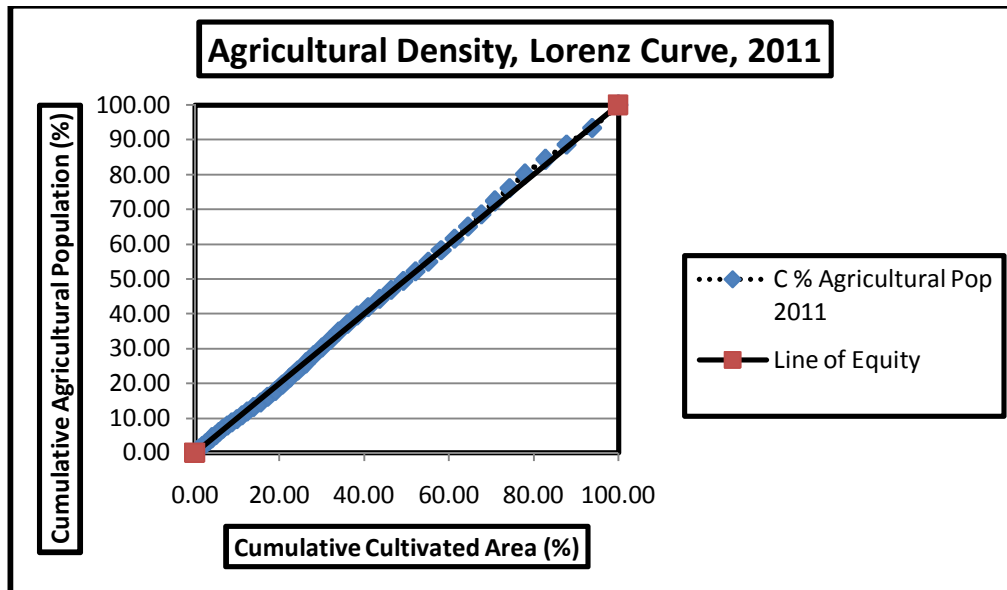
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Figure 2. Konkan Region: Lorenz Curve, 2011
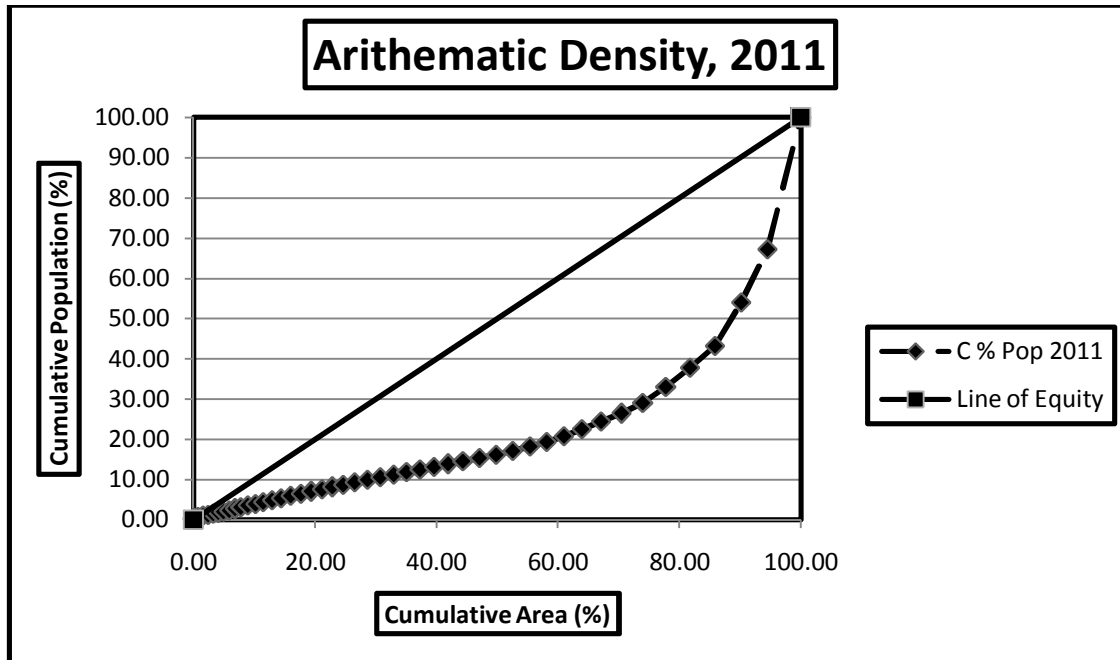
a) **Arithmetic Density**
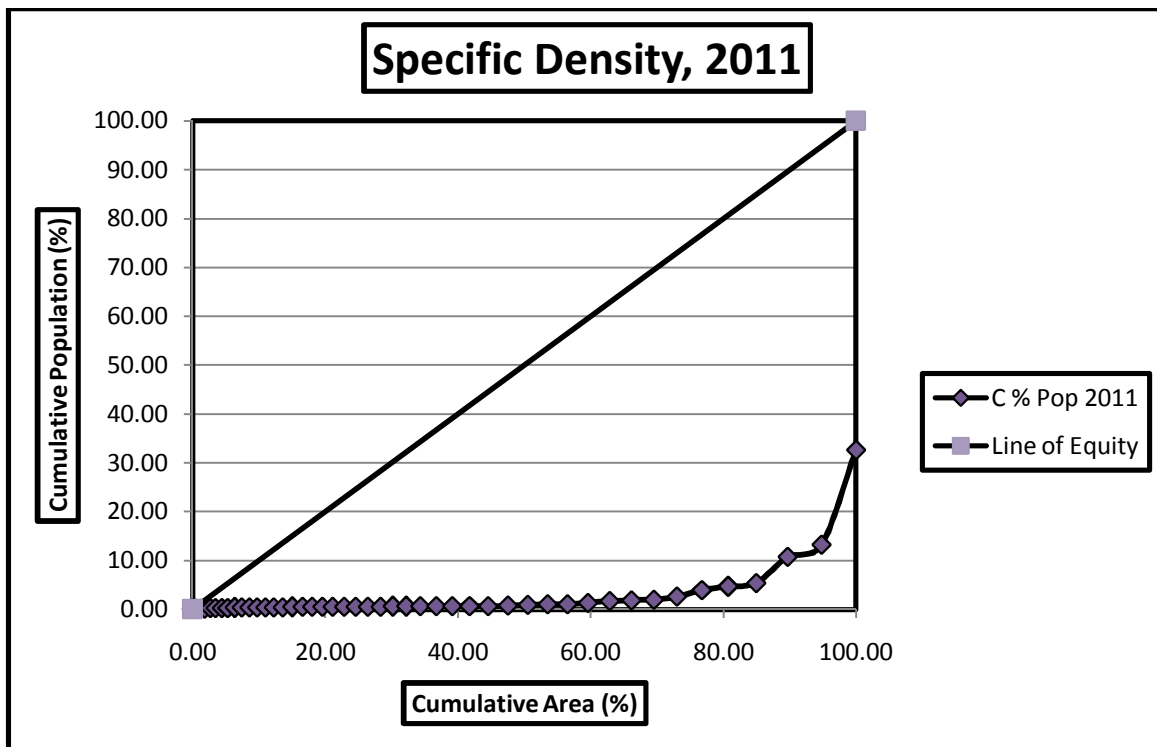
b) **Specific Density**

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c) Physiological Density

d) Agricultural Density

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