

## Geographical Analysis Of Road Densities In Nagpur District

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### Abstract

Roads play an important role in the social and economic development of a country. Road density is very important in road development because in regions where road density is high, trade centers are developed and other services are developed.

Density of road networks means the availability of road network in a particular region in particular area or population. Nagpur district is the main district in Vidarbha region and positive impact of road network is found on the development of this district.

Present paper reveals the analysis of relative road density and density of road network by population in Nagpur district.

**Keywords :** Road, Density, Relative, Per Sq.Km.,  
Population.

### Introduction

Road density refers to the number of roads in a particular area. Road density is the ratio of the geographical area of any area to the length of roads. Areas where the landscape is flat have higher road density while hilly areas have less road density.

In the present paper, the different densities of roads in Nagpur district have been studied. In this, relative density per square km area, and road density according to population according to tehsil have been studied.

### Objectives of the Study

The main objectives of the present research paper as follows,

- i) To analysis the tehsil wise density of road network in per sq.km. area in Nagpur district
- ii) To analysis, the tehsil wise road density by per 1000 population in Nagpur district.

### Data Source and Methodology

Present research paper is based on the mainly secondary source of data. The road data and base map is collected from P.W.D. office Nagpur. Population is compiled from Census 2011.

The following formulas are used for the calculation of relative road density and density of road network in per 1000 population.

$$\text{RD (Per Sq. Km.)} = \frac{\text{RI}}{\text{A}}$$

RD – Relative Density

RI – Total Road Length in Km

A – Geographical Area in Sq.Km.

$$\text{RDP (Per 1000 Population)} = \frac{\text{Rd}}{\text{P}} \times 1000$$

RD<sub>p</sub> – Density of Road Network (Per 1000 Population)

Rd – Total Road Length

P – Total Population

### Study Area

Nagpur district is lies in between 20<sup>0</sup>35'09" north to 21<sup>0</sup>44'15" north latitude and 78<sup>0</sup>15'05" east to 79<sup>0</sup>40'36" east longitude above the equatorial. Total geographical area of the district is 9892 Sq.Km.

According to census of 2011 the total population of Nagpur district 46,53,177. Which include 23,88,588 male population and 22,64,613 female population. The population shows rising trend of 14.39% from 2001 to 2011. Surprisingly Nagpur is 3.22% of Maharashtra according to area covered, but carried population of 4.14% of Maharashtra. Again one surprising fact is that it's having population density of 470 person/ sq. km but Maharashtra having 365 and India having population density of 325.

### Relative Road Density (Per Sq.KM.)

The relative density of the total road network of the entire district is 1.86 km. The average length of roads in the district is 1.86 km per square kilometer as compared to the area of the entire district.

The total density in the district is divided into 3 groups. The analysis is divided into tehsils with less than 2 km roads per sq km as low density, tehsils with 2 to 4 km density as medium and tehsils with more than 4 km roads as high density.

Table No. 1 shows the total length, total geographical area and relative density of roads in the district by tehsil wise

**Table No. 1 Nagpur District – Relative Road Density (Per Sq.Km)**

| <b>Tehsils</b>        | <b>Total Road Length in Km</b> | <b>Area Sq.Km</b> | <b>Density/Sq.Km</b> |
|-----------------------|--------------------------------|-------------------|----------------------|
| Narkhed               | 1242.23                        | 703               | 1.77                 |
| Katol                 | 1441.24                        | 904               | 1.59                 |
| Kalmeshwar            | 1064.23                        | 508               | 2.09                 |
| Savner                | 967.28                         | 646               | 1.50                 |
| Parshivani            | 1073.69                        | 805               | 1.33                 |
| Ramtek                | 1215.25                        | 1168              | 1.04                 |
| Mauda                 | 1362.44                        | 619               | 2.20                 |
| Kamptee               | 1220.77                        | 403               | 3.03                 |
| Nagpur Rural          | 1281.83                        | 659               | 1.95                 |
| Nagpur Urban          | 2559.09                        | 218               | 11.74                |
| Hingana               | 1221.77                        | 780               | 1.57                 |
| Umred                 | 1408.24                        | 989               | 1.42                 |
| Kuhi                  | 1380.08                        | 816               | 1.69                 |
| Bhiwapur              | 934.32                         | 674               | 1.39                 |
| <b>Total District</b> | <b>18372.46</b>                | <b>9892</b>       | <b>1.86</b>          |

Source – Road Data is Compiled from P.W.D. District Office, Nagpur and Density is calculated by author

#### **High Relative Density of Road Network**

High relative density of roads in Nagpur district is found only in Nagpur urban tehsil. Nagpur is the main city i.e. fully part of Nagpur Urban Tehsil. There are 11.74 km of roads per sq km in this area. The area of this tehsil is the least in the district, while the length of the road is the longest. Therefore, the density of roads per square km is high. All the national highways passing through the district pass through this tehsil

and traffic is always high. High density of roads has affected the development of this tehsil. Nagpur Urban is a developed tehsil compared to other tehsils in the district.

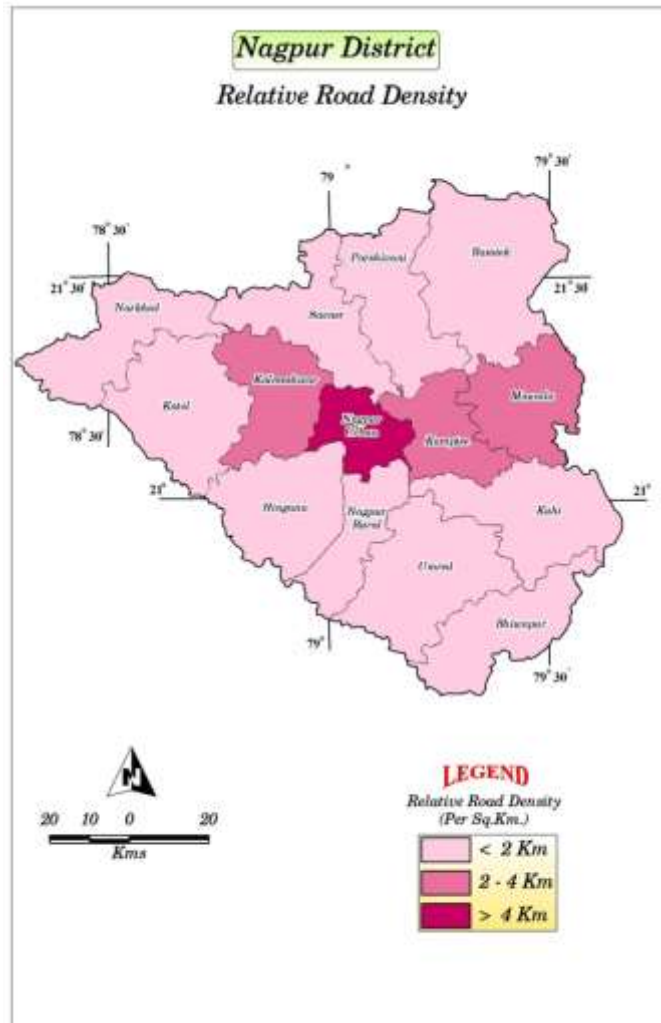


Figure No.1

### Moderate Relative Density of Road Network

In the district Kamptee (3.03), Mauda (2.20) and Kalmeshwar (2.09) tehsil has recorded the absolute road density in between 2to 4 km in per sq.km. The geographical areas of these tehsils are more than 1000 km and road network is moderately developed compare to the geographical area.

The boundaries of these three tehsils are adjacent to Nagpur urban tehsil. Most of the main roads passing through Nagpur city pass through this tehsil, so traffic is heavy in this area.

### Low Relative Density of Road Network

The relative density of roads is low in more than 70% areas of Nagpur district. In the total 10 tehsils of the district, only less than 2 km of roads per sq km are available (Table No.4.2).

In Nagpur district, the density is lowest in two tehsils namely Ramtek (1.04) and Parshivani (1.33). The part of Ramtek and Parshivani tehsil is hilly and compared to the area of this tehsil, the development of roads is still less.

#### **Density of Road Network in per 1000 Population**

Nagpur district currently has 3.95 km of roads per 1000 population. It is found that the length of roads is less compared to the total population of the district.

#### **High Density of Road Network in Per 1000 Population**

Bhiwapur (11.46) and Kuhi (11.13) in two tehsils of Nagpur district have between 11 and 12 km of roads per 1000 population. The density of roads in this tehsil is more as compared to other tehsils as the population of these two tehsils is less in the district. Also, the entire population in both these tehsils is rural and the population in these tehsils has decreased between 2001 and 2011. Hence the density of roads is found to be high in proportion to the population.

#### **Moderate Density of Road Network in Per 1000 Population**

In most of the tehsils of Nagpur district, the density of roads per 1000 population is between 5 to 10 km which is moderate. The density is moderate in more than 60% of the district.

Table No. 2 Shows the tehsil wise density of road network in per 1000 population of Nagpur district.

**Table No. 2 Nagpur District - Density of Road Network in per 1000 Population**

| <b>Tehsils</b> | <b>Total Road Length in Km</b> | <b>Total Population (2011 Census)</b> | <b>Density (Per 1000 Population in Km)</b> |
|----------------|--------------------------------|---------------------------------------|--|
| Narkhed        | 1242.23                        | 147907                                | 8.40                                       |
| Katol          | 1441.24                        | 163808                                | 8.80                                       |
| Kalmeshwar     | 1064.23                        | 122363                                | 8.70                                       |
| Savner         | 967.28                         | 229450                                | 4.22                                       |

|                       |                 |                |             |
|-----------------------|-----------------|----------------|-------------|
| Parshivani            | 1073.69         | 143019         | 7.51        |
| Ramtek                | 1215.25         | 158643         | 7.66        |
| Mauda                 | 1362.44         | 139776         | 9.75        |
| Kamptee               | 1220.77         | 238870         | 5.11        |
| Nagpur Rural          | 1281.83         | 302195         | 4.24        |
| Nagpur Urban          | 2559.09         | 2405665        | 1.06        |
| Hingana               | 1221.77         | 242198         | 5.04        |
| Umred                 | 1408.24         | 154180         | 9.13        |
| Kuhi                  | 1380.08         | 123977         | 11.13       |
| Bhiwapur              | 934.32          | 81519          | 11.46       |
| <b>Total District</b> | <b>18372.46</b> | <b>4653570</b> | <b>3.95</b> |

Source – Road Data is Compiled from P.W.D. District Office, Nagpur and Density is calculated by author

Mauda (9.75), Umred (9.13), Katol (8.80), Kalmeshwar (8.70), Narkhed (8.40), Ramtek (7.66), Parshivani (7.51), Kamptee (5.11). ) and Hingana (5.04) are included in 5 to 10 km of roads are available per 1000 population.

Among them Mauda and Umred have maximum 9 to 10 km of roads per 1000 population while Kamptee and Hingana have the least 5 to 6 km of roads.

In tehsil Ramtek, Parshivani, Umred, area wise density is low but according to population, roads are moderately developed. Population distribution in this tehsil is moderate with low density.



The relative density of roads in Nagpur district is high only in Nagpur urban tehsil and its impact on the development of this tehsil. In other tehsils this density has to be further developed as compared to the area. Also, the adverse effect of the natural structure at Ramtek and Parshivani is found on the road density of this tehsil.

In both Nagpur rural and Savner tehsils, it is observed that the density of roads is low compared to population and area.

In Nagpur district, there is a discrepancy between the density of roads per 1000 population and the density per sq km. Bhiwapur, Kuhi tehsil has low density compared to area and high density compared to population. Also, in tehsils like Ramtek, Parshivani, Umred, the natural structure is not level, the density is low and the population distribution is low, so the density is moderate according to the population. Whereas in developed tehsils like Nagpur Urban, the density of roads per 1000 population is still low.

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