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Identification of Rural Service Centres of Nandurbar District of Maharashtra State

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Abstract

The term, Rural Service Centre plays an important role in the life of the villagers. The main role of a Service Centre is to render services to the surrounding area. In the present study an attempt is made to evolve the methodology for identifying Rural Service Centres of Nandurbar District of Maharashtra and to study them according to their hierarchical orders.

Rural Service Centres constitute an essential component of the rural settlement system by providing goods, services, and infrastructural facilities to surrounding villages. The identification and classification of these centres are crucial for understanding regional development patterns and improving service accessibility in rural areas. The present study examines the Rural Service Centres of Nandurbar District in Maharashtra State and analyzes their hierarchical organization. The research is based on secondary data collected from the Census of India, District Census Handbooks, District Gazetteers, and other government sources. To identify Rural Service Centres, three analytical approaches were employed: Christaller's Method of Centrality, Average Weightage Method, and Threshold Value Method. Centrality scores were calculated using population, tertiary workers, and the availability of various amenities and services. Villages exhibiting surplus centrality scores were considered Rural Service Centres. The results reveal significant variations in the number of identified service centres across the three methods. Christaller's Method identified 153 villages (16.14%) as Rural Service Centres, the Threshold Value Method identified 73 villages (7.91%), while the Average Weightage Method recognized 670 villages (71.39%). Hierarchical analysis further showed that the majority of service centres belong to lower-order categories, indicating an uneven spatial distribution of services and facilities. The study highlights the importance of methodological selection in rural service centre identification and demonstrates that while some areas possess adequate service infrastructure, many rural settlements continue to depend on larger villages and urban centres for essential services. The findings provide valuable insights for regional planning, rural development strategies, and the equitable distribution of socio-economic infrastructure in Nandurbar District.

Keywords: Rural Service Centre, Centrality, Centrality Score, Hierarchical Order etc.

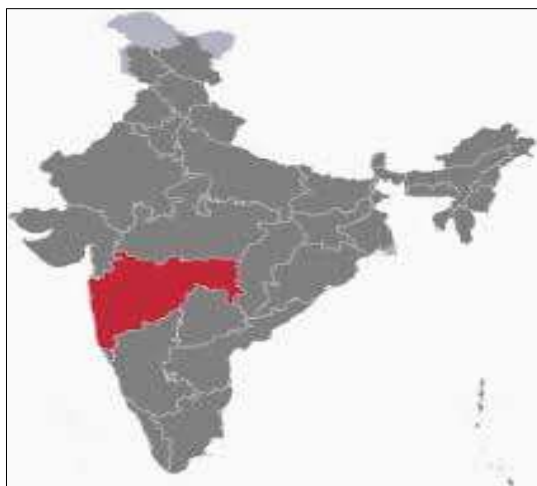
Introduction

From ancient times, Service Centres have occupied a pre-eminent position in the rural life-system. They provided focal points for the provision of services and goods for people living in isolated and dispersed areas. Being centres of collection and distribution, Rural Service Centres assume even greater significance today, as convenient nodes for propagating socio-economic development and providing vital linkages in the communication and delivery systems.

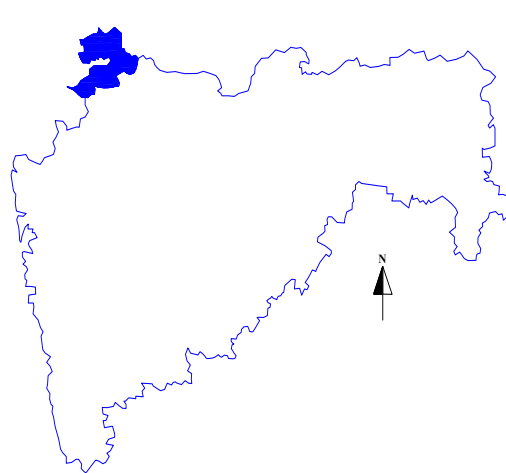
A Study of service centres helps to better understand the region in sharing the functions of a rural set up. It takes in to account the growth poles of the region and gives a glimpse of the possible bases for expansion in the future'. (Job, 1980)

The term 'Rural Service Centre' is mainly concerned with 'Central Place' and the term 'Central Place' was first time used by Mark Jefferson in 1931. This term, however, becomes more significant after the classical study of Walter Christaller in 1933.

Location Map



India: Location of Maharashtra



Maharashtra: Location of Nandurbar District

Study Region

For identifying the rural service centres, Nandurbar district has been selected as a study area. The Nandurbar District lies between 20° 50" and 22° 17" north latitude and 73° 30" and 74° 50" east longitudes. District is surrounded by the States of Madhya Pradesh, Gujarat and Nandurbar District of Maharashtra. Madhya Pradesh lies at its eastern and northern side and Districts Surat and Baroda of Gujarat are at its western side and Nandurbar District is at southern side. The district headquarters, Nandurbar is the main railway station in the District on the Ahmadabad–Howrah route of western railway. the district has a population of 1,648,295. The density of population is 277 persons per sq. km. as per 2011 census. The district has an area of 7,195 sq. km, and a population of 20,50,862 as per the Census 2011. The density of the population is 285 persons per sq km. The total number of villages inhabited in Nandurbar district is 930.

Objectives

1. To explain the term service center and identify the Rural service centers in the region under study.
2. To arrange the Rural Service Centres in Hierarchical order and study them according to their orders.

Need of Study

Rural Service centre is an accessible location from which goods and services are provided for rural people living in the surrounding area.

Rural Service Centre is the functional unit of grocery shops, general merchandise shops, minor repair facilities, tailor shops, barber shops, restaurants, primary and middle schools, health, post, transport, co-operative, community centres and other necessary infrastructural facilities.

Sometimes service centres may improve life style of the surrounding community, because the standard of rural life depends upon availability of facilities. If these amenities and services are inadequate, they are rendered by these Service centres. Considering with the functional importance of rural service centre in rural area it is necessary to find out and study them in any given area.

Database

- In the present geographical study, a systematic approach has been used and balanced geographical account of Rural Service centres of Nandurbar District has been developed on the application of firm statistical base.
- The secondary data have been collected from the District Census Handbooks, District Gazetteer, Government Websites

Methodology

In the present study, for determination of Rural Service Centres in Nandurbar District, following three methods have been applied. The service centre provides available amenities and services to its surrounding population. The amenities are in terms of units while services engaged in tertiary services are served by workers. It is therefore, centrality scores can be calculated with the help of threshold population required for each amenity. For these, following two first methods are applied. The third method – Christaller's Method is applied to the workers engaged in tertiary activities especially 'Other workers'.

1. Threshold Value Method
2. Average Weightage Method
3. Christaller's Method of Centrality

By applying these methods, centrality scores of all villages in the district have been calculated and those villages which have surplus centrality scores are considered as Rural Service Centres.

Methods For Measuring Centrality

1. Christaller's Method of Centrality

This Method is based on Walter Christaller's centrality formula. In this method, the centrality of a particular place is determined by the following equation-

$$Ca = Ta - (Pa \times \frac{Td}{Pd})$$

Where,

Ca is Centrality of 'A' Place
Ta is Total Number of Tertiary Workers of 'A' Place
Pa is Total Population of 'A' Place
Td is Total Number of Tertiary Workers in the Region
Pd is Total Population of the Region

In this method, two steps are involved-

Step- 1. Find out centrality of a particular place (Rural settlement) by applying above mentioned formula.

Step- 2. Determine the Rural Service Centres with the help of centrality score of all villages.

2. Average Weightage Method

This method is somewhat similar to that of Threshold value method. In this method, ratio of average amenity and average population per village in the district as a whole is considered as one weightage. This ratio is considered as a threshold value for occurring a particular amenity in a region under consideration. This method is applied by following manner-

Step- 1. Calculate average population per village in the district

$$\text{Population Per Village} = \frac{\text{Total Rural Population in the Region}}{\text{Total No. of Villages in the Region}}$$

Step- 2. Calculate average number of particular amenities per village in the region.

$$\text{'X' Amenity Per Village} = \frac{\text{Total 'X' Amenities in rural area of the Region}}{\text{Total No. of Villages in the Region}}$$

Step- 3. Consider 1 weightage for the calculated ratio.

$$\text{'X' Amenity Per Person} = \frac{\text{'X' Amenity Per Village}}{\text{Population Per Village}}$$

Step- 4. Determine the expected weightage of each amenity of every settlement with the help of 'X' Amenity per Person.

$$\text{Expected Weightage of 'X' Amenity of 'A' Place} = \frac{\text{'X' Amenity Per Person} \times \text{Total Population of 'A' Place}}{X}$$

Step- 5. Find out amenity-wise differences between the actual number of amenities and expected weightage of a village.

Step- 6. Calculate Centrality Score of settlements by adding of all amenity-wise differences of a particular settlement.

Step- 7. Determine Service Centres with the help of surplus centrality score of all villages.

3. Threshold Value Method

This method is based on **Threshold Population Weightages**. In this method, following steps are involved-

Step-1. Classify selected amenities of rural settlements in the study region by different population sizes.

Step- 2. Prepare frequency table for each amenity. Apply quartile technique.

Formula –

$$Q_1 = L + \frac{(\frac{N}{4} - Cf)}{f} \times CI$$

Step – 3. Consider the calculated value of Q₁ as a threshold population for that particular amenity / service. Threshold population means the initial population or demand for establishing a particular function in a settlement or area.

Step- 4. Assign 1 Weightage to the value of Q₁ (Threshold population).

$$\text{Expected Weightage of 'X' Amenity Of 'A' Place} = \frac{\text{Total Population of 'A' Place}}{\text{Threshold Value of 'X' Amenity}}$$

Step- 5. Determine the expected weightage of each amenity of every settlement with the help of threshold population and total population of the settlement.

$$\text{Differences between the actual number and expected weightage of 'X' Amenity of 'A' Place} = \frac{\text{Actual Number of 'X' Amenity of 'A' Place}}{\text{Expected Weightage of 'X' Amenity of 'A' Place}}$$

For example

1. If a village is having 3 primary schools and the total population of that village is 2000.
2. Assuming that, the calculated Q1 value for one primary school in the region is 1000. Which means the value is considered as a threshold population for establishing 1 primary school in a village.
3. Considering 1 weightage for a threshold population, the expected weight required for the village would be 2. This means the village has 1 weightage surplus, which would be used for rendering the service of primary school to the surrounding population.

Step-6. Find out amenity- wise differences between the actual number of amenities and expected weightages of a settlement.

Step-7. Calculate total differences of weightages of all amenities in a settlement.

Step-8. If the particular village is having a Surplus Centrality score, the village is said to be as a rural service centre.

Step-9. On the basis of this technique, determine the total number of rural service centres in the study region.

Step-9. With help of Zip's graphical method of hierarchical order, find out the various hierarchical orders of all rural service centres in the region under study.

By applying the above research techniques, the following results are obtained:

Table No.1

Nandurbar District: Total number and proportion of Rural Service Centres to total number of rural settlements, identified with the help different methods

Sr. No.	Tahsil	Service Centres By					
		Christaller's Centrality Method		Threshold Value Method		Average Weightage Method	
		Numbers	Percentage	Numbers	Percentage	Numbers	Percentage
1	Nandurbar	51	34.23	7	4.7	93	62.42
2	Shahada	43	23.63	9	3.85	104	57.14
3	Nawapur	29	18.59	5	3.21	123	78.85
4	Taloda	7	7.61	11	11.96	60	65.22
5	Akkalkuwa	16	8.47	18	9.52	162	85.71
6	Akrani	7	4.32	23	14.2	128	79.01
District		153	16.14	73	7.91	670	71.39

(Source by Author)

Rural Service Centres In The Study Region

When above mentioned methods of centrality have been applied to all rural settlements in the study region, following results are found.

1. By the application of Christaller's Centrality Method, in all 153 villages located in the study region are identified as rural service centres in 2011.
2. Out of the 930 villages in the Region 71.39 percent (670) villages are observed as Rural Service Centres. These Rural Service centres are identified on the basis of Threshold value and the Average Weightage Methods.
3. By applying the Threshold Value Method, about 73 (7.91) villages are identified as Rural Service Centres in the entire District.

Identification of Rural Service Centres according To Christaller's Centrality Method

According to Christaller's Centrality Method, about 153 (16.14%) villages are identified as Rural Service Centres. In this method other workers engaged in the services like education, medical, glossary, transport and facilities like market etc, are considered as tertiary workers. These workers especially considered as other workers provide various services to the villagers. Considering with the number and the proportion of rural service centres existed in the district, the availability of services in the rural area of the district is adequate. Most of the dependent villages for their services are relying on the nearby large settlements or urban centres.

Table No. 2

Nandurbar District: Classification of Rural Service Centres according to their hierarchical orders (According to Christaller's Centrality Method)

Sr. No.	Tahsil	Order of Service Centres					Total
		I	II	III	IV	V	
1	Nandurbar	0	1	2	3	45	51
2	Shahada	1	0	3	8	31	43
3	Nawapur	0	2	0	1	26	29
4	Taloda	0	0	0	1	6	7
5	Akkalkuwa	0	0	0	2	14	16
6	Akrani	0	0	0	0	7	7
District		1	3	5	15	129	153

(Source by Author)

The above table shows that the proportion of rural service centres is very insignificant (0.02). As per this method, the extensive part of the rural area is without service centres. The occurrence of insignificant number of service centres explains that availability of amenities in the rural areas of Nandurbar district is exceedingly inadequate.

**Nandurbar District: Hierarchical Orders of Rural Service Centres according to Surplus centrality scores
(Christaller's Centrality Method, 2011)**

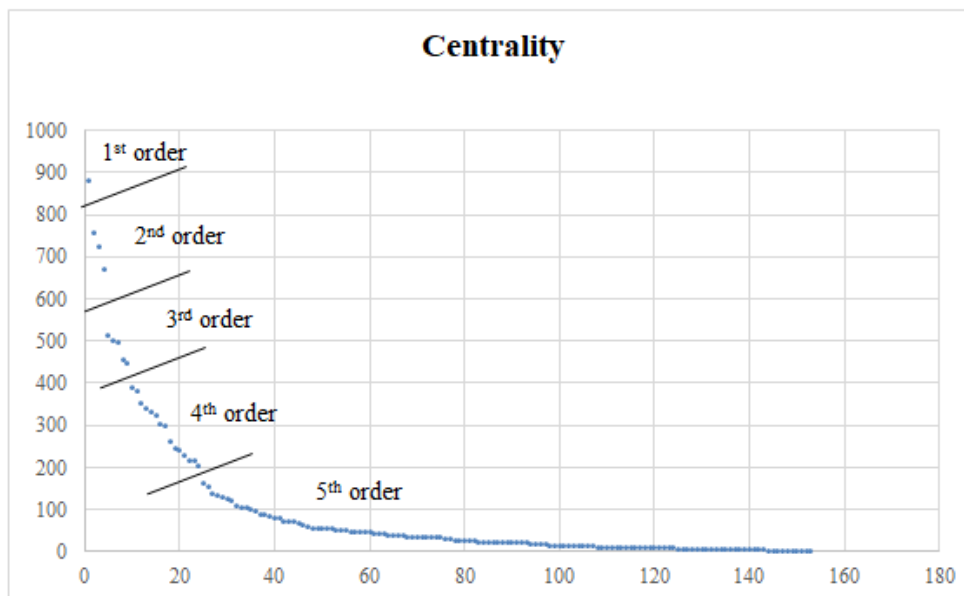


Figure – 1

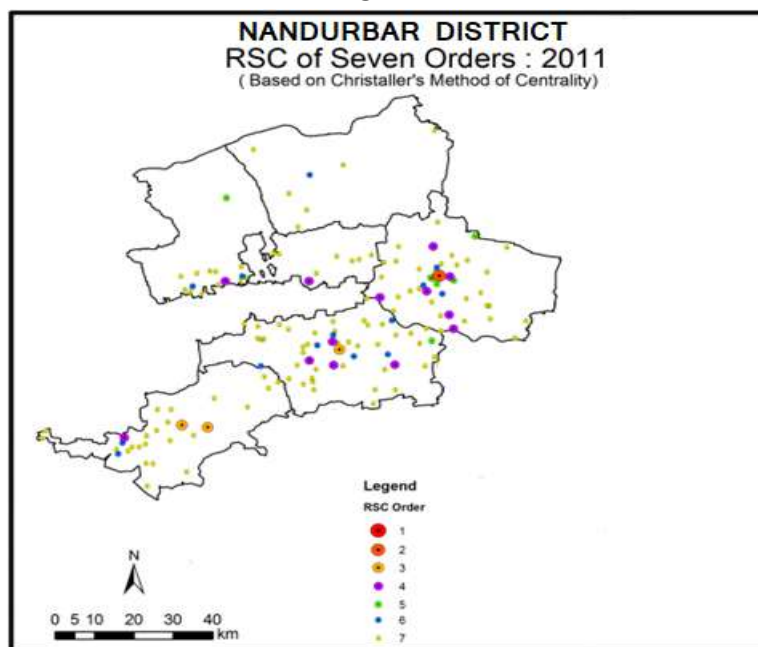


Figure –2

Lonkheda village is the only one first rank Rural Service Centres based on graphical hierarchical order. Lonkheda is having 4.6 surplus centrality. It is located in Shahada tehsil and enjoying the proximity of Nandurbar city. The village

Hol T. Haveli (Nandurbar Tehsil) Visarwadi and Chinchpada (Navapur Tehsil) these three are in second order rural service centre. In third hierarchical order, 5 rural service centres are involved. Out of these, 3 rural service centres are located in Shahada tehsil and other two are located each in Nandurbar tehsil. Fourth and fifth order service centres comprise 15 and 129 Rural service centres respectively. It means most of the rural service centres are placed in lower order in hierarchy.

Identification of Rural Service Centres According To Average Weightage Method

According to Average Weightage Method, out of the total number of (930) villages about 670 villages are recognised as Rural Service Centres in Nandurbar district. The proportion of rural service centres is about 71.39 percent. This clears that the region is well served by rural service centres. Every rural service centre generally renders its services at least to a dependent village.

Table No. 3
Nandurbar District: Classification of Rural Service Centres according to their hierarchical orders (According to Average Weightage Method).

Sr. No.	Tahsil	Order of Service Centres					Total
		I	II	III	IV	V	
1	Nandurbar	0	0	0	0	93	93
2	Shahada	0	0	0	1	103	104
3	Navapur	0	0	2	1	120	123
4	Taloda	0	1	0	0	59	60
5	Akkalkuwa	0	0	0	2	160	162
6	Akrani	1	0	1	3	123	128
District		1	1	3	7	658	670

(Source by Author)

Nandurbar District: Hierarchical Orders of Rural Service Centres (Average Weightage Method, 2011)

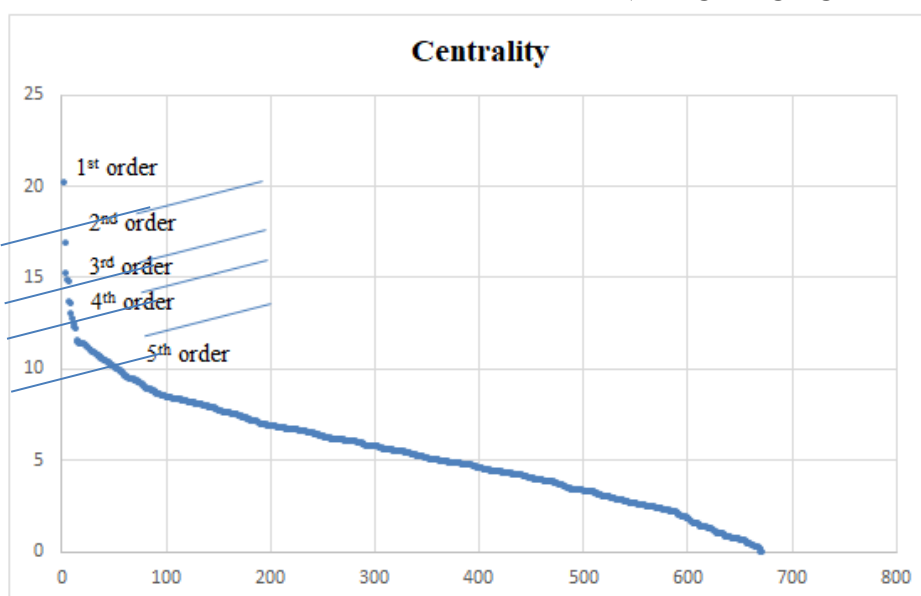


Figure – 3

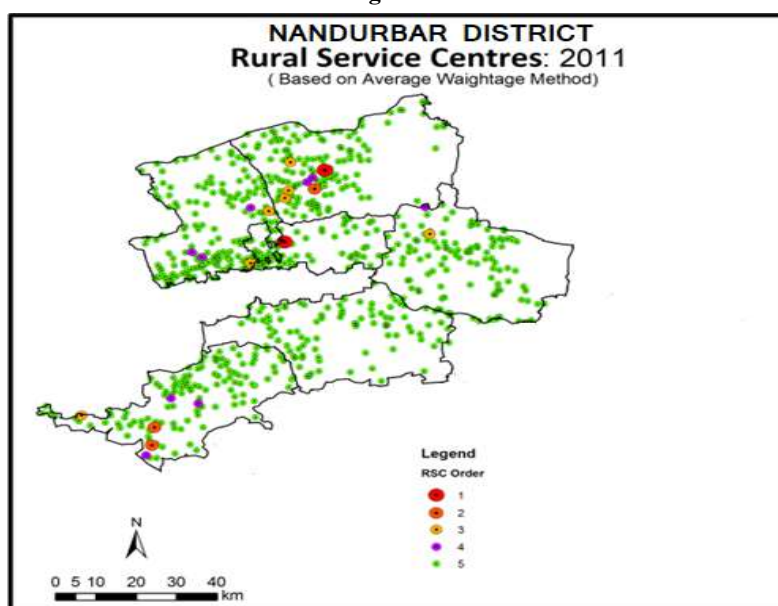


Figure-4

Dhadgaon is the only one First hierarchical order Rural service centre in Akrani tehsil of Nandurbar District. Its centrality score is 20.28 approximately. The Second hierarchical order service centre is also only one, occurred in Talode tehsil namely, Walheri. In the Third hierarchical order Rural Service centres, about 3 villages are included. Out of these, 2 rural service centres are from Navapur tehsil and other 1 from other Akrani tehsil. Near about 95.71 percent (665) villages have been identified in lower order from IV to V orders, dispersed all over the study area, except the north-western hilly region.

Identification of Rural Service Centres According To Threshold Value Method Of Centrality

The rural service centres in Nandurbar district have been identified with the help of the Threshold Value method. It has been found that 73 rural settlements in the study region have been identified as rural service centres. This indicates that, considering the initial requirement of demand which is expressed in terms of threshold population, the services and amenities like education, health and other infrastructural facilities available in Nandurbar district are inadequate. All these rural service centres are classified in hierarchical orders with the help of Zip's graphical method.

Table No. 4

Nandurbar District: Classification of Rural Service Centres according to their hierarchical orders (According to Threshold Value Method of Centrality)

Sr. No.	Tahsil	Order of Service Centres				Total
		I	II	III	IV	
1	Nandurbar		2	1	4	7
2	Shahada		4	1	4	9
3	Navapur			1	4	5
4	Taloda	1	2	1	7	11
5	Akkalkuwa	1	4	5	8	18
6	Akrani	1	2	7	13	23
District		3	14	16	40	73

(Source by Author)

Nandurbar District: Zip's graphical method of Hierarchical orders of Rural Service Centres: Threshold Value Method of Centrality (2011)



Figure – 5

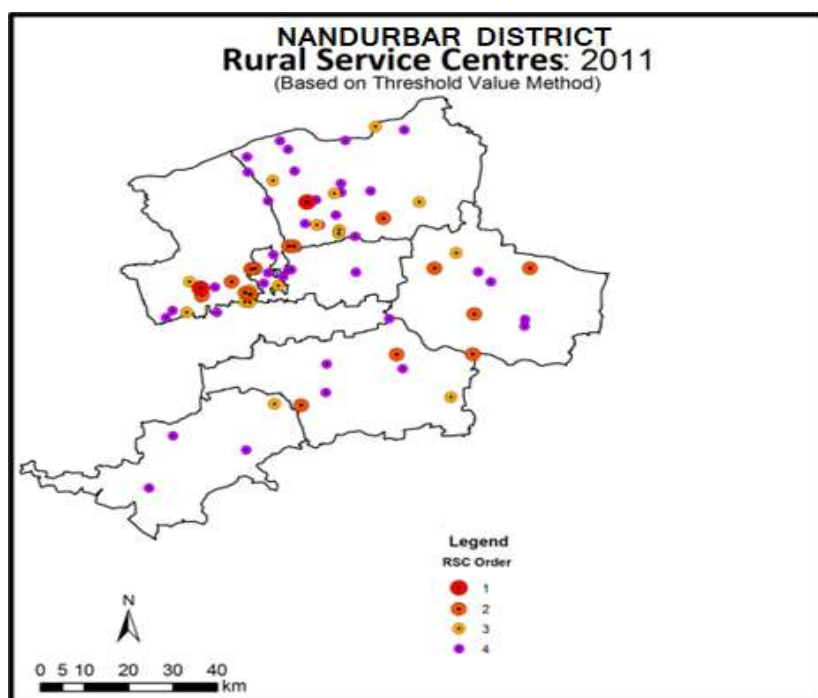


Figure – 6

Ukhalsag, Halalpur and Chippal are first order service centres as per Threshold value method. They are not much large settlements but acquired the central locations. Ukhalsag is in Akkalkuwa tehsil, Halalpur in Talod and Chippal in Akrani tehsil. As per the requirement of surrounding population they provide facilities of our own and hinterlands population. place in which educational, medical, commercial and transport services are available in surplus quantity, providing various services to the surrounding semi-tribal region. The Second order rural service centres are identified in all tehsils in the district under study. More than 80 percent rural service centres are in lower order. These rural centres generally provide one or two lower order services to their surrounding villages.

Table No 5

Nandurbar District: Hierarchical Order-Wise Rural Service Centres (2011): Based On Various Centrality Methods

Hierarchical Order of Service Centres	No. of Service Centres		
	Christaller's Method of Centrality	Average Weightage Method	Threshold Value Method
1st or Highest	1	1	3
2nd	3	1	14
3rd	5	3	16
4th	15	7	40
5th	129	658	0
Total	153	670	73

(Source by Author)

Considering with the comparative study of all rural service centres identified with three methods, it becomes clear that, the total number of rural service centres identified with the help of Third method – Threshold value method – is very insignificant, this might be due to the availability of amenities in relation to threshold population is quite inadequate. In the second method, amenity wise expected weightages are calculated with the help of ratio- number of amenity per village per person. It brings to the conclusion that a large number of rural amenities are available consequently a large number of rural service centres are identified in the study region. The First method considers total rural workers engaged in tertiary pursuits. The resulted number of rural service centres is quite reasonable as compared to above two methods.

Conclusion

Rural Service Centre plays an important role in the life of the villagers. The main role of a Service Centre is to render services to the surrounding area. In the present study an attempt is made to evolve the methodology for identifying Rural Service Centres of Nandurbar District of Maharashtra and to study them according to their hierarchical orders.

The service centre provides available amenities and services to its surrounding population. The amenities are in terms of units while services engaged in tertiary services are served by workers. It is therefore, centrality scores can be calculated with the help of threshold population required for each amenity. For these, following two first methods are applied. The first method – Christaller's Method is applied to the workers engaged in tertiary activities especially 'Other workers'.

1. Christaller's Method of Centrality

2. Average Weightage Method
3. Threshold Value Method

By applying these methods, centrality scores of all villages in the district have been calculated and those villages which have surplus centrality scores are considered as Rural Service Centres.

The rural service centres in Nandurbar district have been identified with the help of the Threshold value method. It has been found that 73 rural settlements in the study region have been identified as rural service centres. This indicates that, considering the initial requirement of demand which is expressed in terms of threshold population, the services and amenities like education, health and other infrastructural facilities available in Nandurbar district are inadequate.

As per this method, the extensive part of the rural area is without service centres. The occurrence of insignificant number of service centres explains that availability of amenities in the rural areas of Nandurbar district is exceedingly inadequate. There were rare settlements which have their own amenities like basic infrastructure etc.

According to Average Weightage Method in entire district near about more than half villages are rural service centres, it is a good sign for the development of rural area.

According to Christaller's Method of Centrality, the number and the proportion of rural service centres existed in the district, are adequate. Most of the dependent villages for their services are relying on the near by large settlement or on urban centres.

Finally, the selection of the research methods depends upon the availability of amenities and services, total number of villages and total rural population. In the present paper though the threshold population method is a sound technique but here in this study it has not shown the satisfactory result. Other two methods are quite applicable as they have given a reasonable number of rural service centres in the region under study.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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