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THE ASSESSMENT OF NET SOWN AREA AND RURAL SETTLEMENT IN SOLAPUR DISTRICT: A GEOGRAPHICAL APPROACH

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ABSTRACT

The study investigates the relationship between net sown area and rural settlement patterns in Solapur district, a semi-arid region of Maharashtra. In 2022–23, the district reported 70.48% of its geographical area under cultivation, with high net sown percentages in Pandharpur (83.55%), Barshi (83.29%), and North Solapur (82.31%), where fertile black soils and irrigation have encouraged intensive farming and compact settlements. Conversely, drought-prone tahsils like Sangola (42.25%) and Malshiras (61.11%) recorded low cultivation, resulting in dispersed settlements and higher dependence on non-agricultural activities. Rural household data from the 2011 Census show Malshiras and Pandharpur as settlement-dense regions, while North Solapur recorded the lowest concentration. Spearman's Rank Correlation (r = 0.40) indicates a moderate positive relationship between net sown area and rural households, though deviations highlight the role of rainfall, irrigation, migration, and urban influence. The findings emphasize that physical geography and socio-economic conditions jointly shape settlement distribution and stress the need for integrated water management, sustainable agriculture, and livelihood diversification to reduce regional disparities in Solapur district.

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INTRODUCTION

Agriculture and settlement are deeply interconnected elements of the geographical landscape, particularly in semi-arid regions like Solapur district of Maharashtra. The **net sown area** serves as a vital indicator of land use, reflecting the proportion of geographical land devoted to cultivation, while **rural settlement patterns** mirror the human response to environmental and agricultural conditions. In Solapur, where rainfall is irregular and soil fertility varies across tahsils, the extent of net sown area directly influences the size, density, and distribution of rural settlements.

The assessment of net sown area reveals significant disparities: fertile and irrigated tahsils such as Pandharpur, Barshi, and North Solapur exhibit very high cultivation levels and compact rural settlements, whereas drought-prone tahsils like Sangola and Malshiras show limited cultivable land and dispersed settlements. These spatial variations highlight the role of natural factors—soil, rainfall, and irrigation—in shaping agricultural land use, as well as socio-economic factors that determine settlement concentration.

A geographical approach to studying the relationship between net sown area and rural settlement in Solapur district is essential for understanding rural livelihoods, regional disparities, and land use sustainability. By analyzing land utilization data, census information, and correlation methods, this study provides insights into how physical geography and human activities interact, thereby offering a comprehensive framework for regional planning and balanced development.

STUDY AREA

Solapur district, located in the south-eastern part of Maharashtra between 17°10′ N to 18°32′ N latitudes and 74°42′ E to 76°15′ E longitudes, covers a total geographical area of 14.88 lakh hectares. Administratively, it comprises 11 tahsils, with Solapur city as the district headquarters. The district lies in the semi-arid rain shadow zone of the Western Ghats, receiving low and uncertain rainfall of about 560–600 mm annually. Soils are predominantly deep black cotton (regur), supporting both food and cash crops. The net sown area in 2022–23 is 10.49 lakh hectares, which is 70.48% of the total area. Agriculture is the main occupation, with irrigation provided by the Ujani canal, tanks, wells, and lift irrigation, though coverage is uneven. As per the 2011 Census, Solapur has 5.93 lakh rural households and a rural population of 29.18 lakh, with compact settlements in fertile, irrigated tahsils like Pandharpur and Barshi, and scattered settlements in drought-prone areas such as Sangola and Mangalwedha.

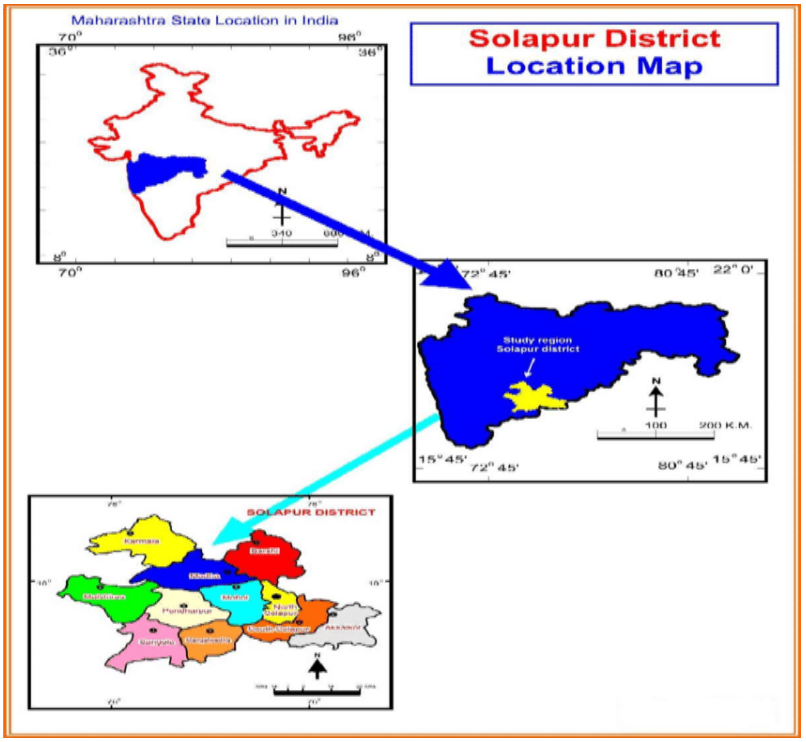

Fig. No. 1

OBJECTIVES

1. To examine the extent and distribution of net sown area across different tahsils of Solapur district.
2. To analyze the spatial pattern of rural settlements with respect to population and households.
3. To evaluate the correlation between net sown area and rural settlement using Spearman's Rank Order Method.

DATABASE AND METHODOLOGY

The present study is based on secondary data collected from reliable government sources such as the *Socio-Economic Review and District Statistical Abstract of Solapur District (2022–23)*, the *District Census Handbook (2011)*, and other relevant reports. Data on geographical area, net sown area, rural households, and population were compiled at the tahsil level to assess spatial variations in agricultural land use and settlement distribution. Statistical techniques were employed to analyze the relationship between net sown area and rural settlements. In particular, the **Spearman's Rank Order Correlation Method** was applied to measure the degree of association between agricultural land use and rural household concentration. The data were tabulated, ranked, and interpreted using geographical approach, supported by maps, tables, and

diagrams to bring out spatial patterns, regional disparities, and their implications for rural development in Solapur district.

NET SOWN AREA

Net sown area is a key indicator of agricultural land use, indicating how much of the geographical area is under cultivation. Solapur district, located in the semi-arid rain shadow region of Maharashtra, had a total net sown area of 10.49 lakh hectares in 2022-23, i.e. 70.48% of its geographical area. Tehsils like Pandharpur (83.55%), Barshi (83.29%) and North Solapur (82.31%) record very high percentages due to fertile soil and irrigation support, while drought-prone tehsils like Sangola (42.25%) and Malshiras (61.11%) show lower values. These variations directly impact rural settlement patterns – compact and dense in fertile zones and scattered in drought-prone areas. Assessment of net sown area thus provides insights into land use, rural livelihoods and regional development.

TABLE - 1

SOLAPUR DISTRICT: NET SOWN AREA (2022-23)

Sr. No.	Tahsil Name	Total Geographical Area	Net Sown Area	Net Sown Area Compare to Geographical Area
1	N. Solapur	68304	56219	82.31
2	Barshi	152251	126811	83.29
3	Akkalkot	140133	94974	67.78
4	Mohol	131683	94368	71.66
5	Mangalwedha	114156	70798	62.02
6	Pandharpur	129437	108143	83.55
7	Sangola	159438	67358	42.25
8	Malshiras	160802	98260	61.11
9	Karmala	159581	121509	76.14
10	Madha	152605	114621	75.11
11	S. Solapur	119467	95524	79.96
Total	1487857	1048585	70.48	

Source: Socio-Economic Review and District Statistical Abstract

In case of High Net Sown Area, tahsil like Pandharpur (83.55%), Barshi (83.29%), and North Solapur (82.31%) fall into the *high category*. In these tahsils, more than four-fifths of the geographical area is under cultivation. The main reasons are the dominance of fertile deep black cotton soils (Regur soils), the presence of perennial irrigation facilities through canals and wells, and the suitability of soils for crops such as sugarcane, wheat, and pulses. Rainfall, although

irregular, is better utilized through water conservation projects and cooperative irrigation systems. These factors have encouraged intensive agriculture and multiple cropping. Villages in these regions show compact and nucleated settlements, where most of the population depends solely on farming, leading to high rural density and stronger agricultural economy.

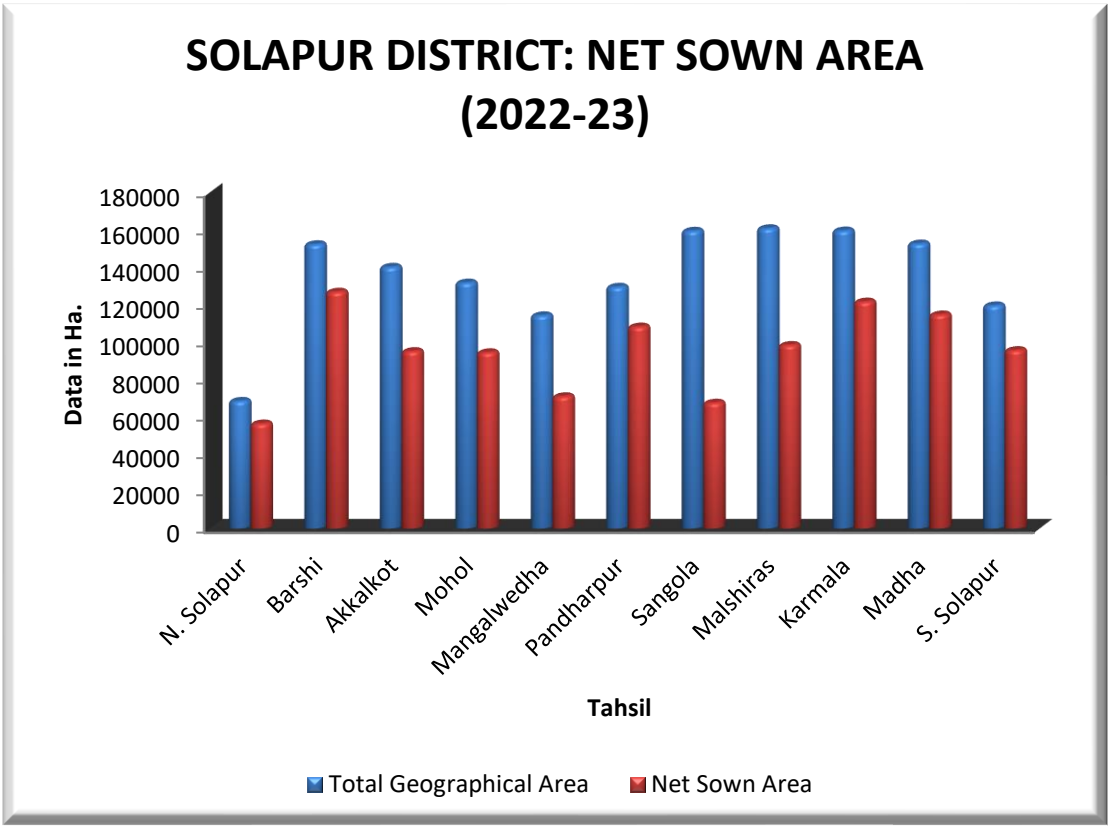

Fig. No. 2

About Moderate Net Sown Area, tahsil such as South Solapur (79.96%), Karmala (76.14%), Madha (75.11%), Mohol (71.66%), and Akkalkot (67.78%) represent the *moderate category*. Here, nearly two-thirds to three-fourths of the geographical area is cultivated. Although soils are generally fertile, the major limiting factor is uncertain rainfall and partial irrigation coverage. These tahsils depend heavily on seasonal rainfall, with only a few assured irrigation sources such as minor tanks, wells, and lift irrigation. Cropping pattern is generally dominated by cereals (jowar, bajra), pulses, and oilseeds, with limited sugarcane or commercial crops. Villages here show semi-compact settlement patterns, where agricultural land is interspersed with patches of wasteland or fallow land. Farmers in these areas often rely on mixed farming, animal husbandry, and seasonal migration to supplement their livelihood.

Lastly, about Low Net Sown Area, tahsil like Malshiras (61.11%), Mangalwedha (62.02%), and especially Sangola (42.25%) belong to the *low category*. In these drought-prone tahsils, less

than two-thirds—and in Sangola less than half—of the geographical area is under cultivation. The reasons are low and erratic rainfall, frequent droughts, scarcity of assured irrigation, and shallow soils with poor moisture retention. A significant portion of land remains uncultivable or fallow due to water stress. Crops grown are mainly drought-resistant varieties such as jowar, bajra, pulses, and groundnut, with very little area under commercial crops. These conditions have shaped dispersed and scattered settlements, where villages are widely spaced, populations are sparse, and dependence on non-agricultural occupations such as weaving, trading, and seasonal labor migration is high. The agricultural economy here is weak, making these areas highly vulnerable to climatic fluctuations.

RURAL SETTLEMENT

The backbone of the socio-economic fabric of Solapur district are rural settlements, where agriculture is the main occupation and livelihood of the people. Rural settlements are not just a collection of houses but a reflection of human adaptation to the natural environment, land resources and socio-cultural traditions. The distribution, size and shape of these settlements are closely linked to the extent of cultivable land, availability of water, soil fertility and irrigation facilities. As per the 2011 census, Solapur district has 5,93,560 rural households with a total rural population of 29.18 lakh. In the tehsil, Malshiras (86,320 households; population 4.21 lakh) and Pandharpur (68,583 households; population 3.43 lakh) are the largest in terms of concentration of rural settlements, mainly due to fertile soil, irrigation base and religious importance of Pandharpur.

TABLE - 2

SOLAPUR DISTRICT: RURAL SETTLEMENTS AND POPULATION(2011)

Sr. No.	Name of Tahsil	No. of Rural Households	Population
1	Karmala	49017	231290
2	Madha	62153	301564
3	Barshi	55256	253989
4	North Solapur	21450	105794
5	Mohol	56836	276920
6	Pandharpur	68583	343445
7	Malshiras	86320	421244
8	Sangola	57825	288524
9	Mangalwedha	37354	184108
10	South Solapur	51230	260897
11	Akkalkot	47536	250890
	Total	593560	2918665

Source: District Census Handbook, Solapur (2011).

About High Rural Settlements, tahsil like Malshiras (86,320 households; 4.21 lakh population), Pandharpur (68,583 households; 3.43 lakh population), and Madha (62,153 households; 3.01 lakh population) fall in the *high category*. These tahsils record the largest concentration of rural population because they have relatively fertile black cotton soils, better irrigation facilities from canals, tanks, and wells, and favorable conditions for cultivating both food crops and cash crops such as sugarcane, wheat, and fruits. Pandharpur's religious and cultural significance as a pilgrimage center also attracts population concentration and supports rural economy through allied activities like trade and services. In Malshiras, sugarcane cultivation and cooperative sugar factories provide stable agricultural income, leading to larger, compact villages. Madha, with moderate irrigation and fertile soils, also shows dense rural settlements. Thus, these tahsils are characterized by compact, nucleated, and populous villages, where agriculture is intensive, and non-agricultural occupations are also integrated into the settlement economy.

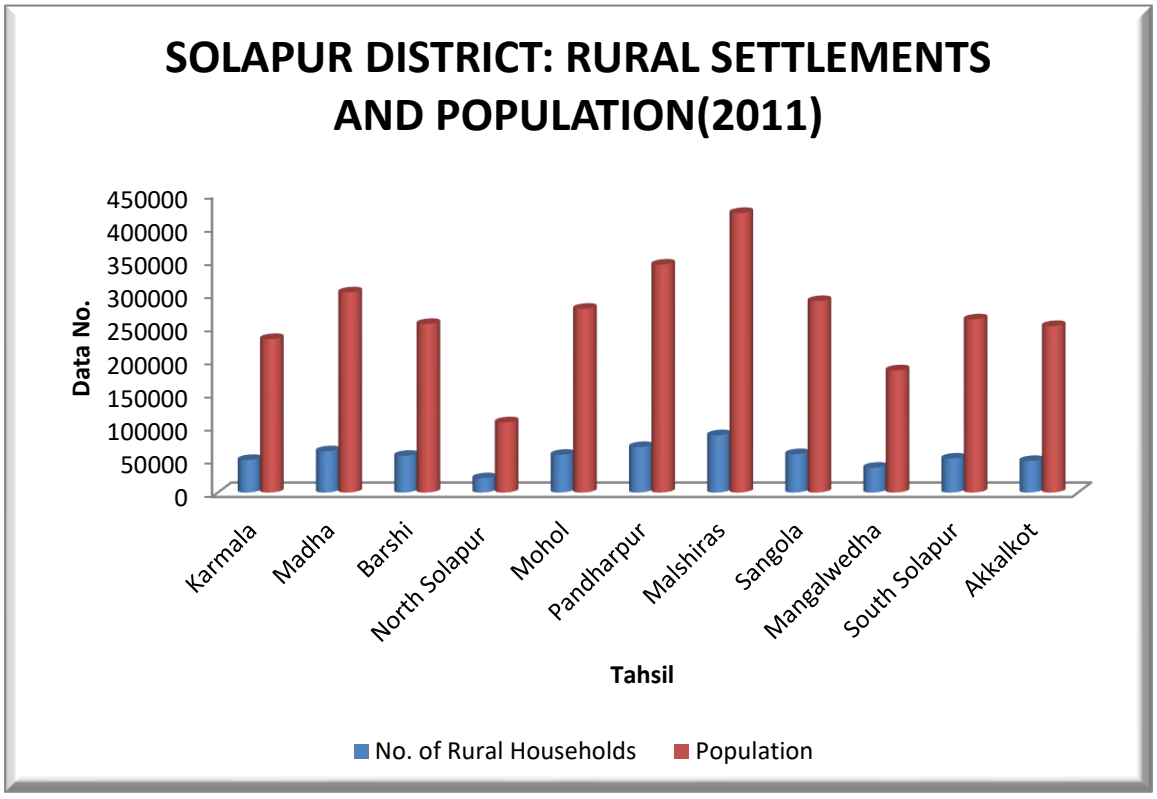

Fig. No. 3

About Moderate Rural Settlements and Population, Tahsil such as Mohol (56,836 households; 2.76 lakh population), Sangola (57,825; 2.88 lakh), Barshi (55,256; 2.53 lakh), South Solapur (51,230; 2.60 lakh), and Akkalkot (47,536; 2.50 lakh) belong to the *moderate category*. Here, the number of rural households ranges from 47,000 to 58,000, and population varies between 2.5–2.8 lakh. These tahsils face semi-arid conditions with irregular rainfall, and only

partial irrigation support is available. Agriculture remains the mainstay, but productivity is lower compared to high-category tahsils. Farmers grow cereals (jowar, bajra), pulses, and oilseeds, with limited scope for sugarcane and other cash crops. Settlements here are semi-compact and medium-sized, where villages are moderately dense but interspersed with smaller, scattered hamlets in dry belts. Seasonal migration for work is common, reflecting the vulnerability of agriculture. These tahsils represent a transition between fertile, irrigated zones and drought-prone drylands, and their settlement structure reflects both agricultural dependence and adaptive strategies.

About Low Rural Settlements and Population, tahsil like Karmala (49,017 households; 2.31 lakh population), Mangalwedha (37,354; 1.84 lakh population), and especially North Solapur (21,450; 1.05 lakh population) are in the *low category*. These regions are marked by acute water scarcity, poor rainfall distribution, and limited irrigation sources. Sangola and Mangalwedha, in particular, are known drought-prone tahsils where cultivation is risky, and crop failures are frequent. The soils here are often shallow with poor moisture retention, restricting intensive agriculture. Farming is mainly subsistence-based with drought-resistant crops like jowar, bajra, pulses, and groundnut. In such regions, a large portion of the population is forced to migrate seasonally for labor in urban centers or in irrigated agricultural zones. Villages are dispersed and scattered, with small populations spread across wider areas. In North Solapur, the influence of Solapur city further limits the rural population size, as many people shift towards urban livelihoods. These tahsils highlight the impact of adverse physical geography on settlement distribution, where human habitation is sparse, scattered, and less economically secure.

CORRELATION BETWEEN NET SOWN AREA AND RURAL SETTLEMENT IN SOLAPUR DISTRICT

The Spearman's Rank Order method is used for the calculation of the correlation of Net Sown Area And Rural Settlement in Solapur District. The formula are-

$$r= 1-6(\Sigma d^2)/N(N^2 -1)$$

The relationship between net sown area and rural settlements in Solapur district has been examined using Spearman's Rank Order method. The ranking of tahsils based on net sown area and number of rural households shows both similarities and deviations. Tahsils like Madha (Rank 3 in both) and North Solapur (Rank 11 in both) show perfect correspondence between agricultural land use and settlement size, indicating a direct link between cultivated land and household concentration. Similarly, Mangalwedha (Rank 9 vs. 10) and South Solapur (Rank 6 vs. 7) show close alignment with very low rank differences. On the other hand, tahsils such as Barshi (Rank 1 in net sown area, Rank 6 in households) and Karmala (Rank 2 in net sown area, Rank 8 in households) show wide deviations, suggesting that despite a large net sown area, the number of

rural households is relatively smaller. This could be due to better landholdings per household or partial urban influence. Conversely, Malshiras (Rank 5 in net sown area, Rank 1 in households) and Sangola (Rank 10 in net sown area, Rank 4 in households) highlight cases where the number of households is disproportionately high compared to cultivated area, reflecting higher population pressure on limited agricultural resources.

Table No. 3

NET SOWN AREA AND RURAL SETTLEMENT IN SOLAPUR DISTRICT

Sr. No.	Tahsil Name	Net Sown Area	Rank	No. of Rural Households	Rank	D^2
1	Akkalkot	94974	7	47536	9	4
2	Barshi	126811	1	55256	6	25
3	Karmala	121509	2	49017	8	36
4	Madha	114621	3	62153	3	0
5	Malshiras	98260	5	86320	1	16
6	Mangalwedha	70798	9	37354	10	1
7	Mohol	94368	8	56836	5	9
8	N. Solapur	56219	11	21450	11	0
9	Pandharpur	108143	4	68583	2	4
10	S. Solapur	95524	6	51230	7	1
11	Sangola	67358	10	57825	4	36

The sum of squared rank differences ($\Sigma d^2 = 132$) gives a Spearman's correlation value of r = 0.40, which indicates a moderate positive correlation between net sown area and rural settlements in Solapur district. This suggests that tahsils with larger net sown areas tend to support a greater number of rural households, but the relationship is not uniform due to the influence of physical factors (rainfall, soils, irrigation) and socio-economic factors (migration, urbanization, and occupational diversification).

CONCLUSIONS

The study reveals that the agricultural land use and rural settlement distribution of Solapur district are closely linked but are also shaped by different physical and socio-economic factors. The net sown area of the district, which accounts for 70.48% of the geographical area (2022-23), indicates the dominance of agriculture in the semi-arid landscape. Tehsils like Pandharpur, Barshi and North Solapur, which have more than 80% of their land under cultivation, exhibit compact, nucleated and dense rural settlements supported by fertile black soil, reliable irrigation and intensive farming systems. On the other hand, drought-prone tehsils like Sangola, Malshiras and Mangalwedha, which have low net sown area, record scattered and

dispersed settlement patterns due to water scarcity, poor soil and frequent droughts. Correlation analysis using Spearman's rank order method (r = 0.40) shows a moderate positive relationship between net sown area and rural settlements. This suggests that tehsils with higher proportion of cultivated land generally support more households, but the relationship is not uniform. Deviations are observed – such as Barshi and Karmala, where large amounts of sown area do not translate into a higher proportion of rural households, or Malshiras and Sangola, where the number of households is disproportionately higher than the area under cultivation. These discrepancies highlight the role of socio-economic drivers such as the cooperative sugar industry, pilgrimage-based economy, urban influence, migration and alternative occupations beyond agriculture.

Overall, the assessment highlights that the distribution of land use and settlements in Solapur district is a result of the interaction between physical geography (rainfall, soil, irrigation) and human adaptation (agriculture, economy, migration). Therefore, a balanced rural development strategy should integrate water resource management, sustainable land use practices, and livelihood diversification to reduce regional disparities and enhance resilience in drought-prone tehsils.

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