

Integrated socioeconomic and geospatial attributes to distinguish infrastructure quandaries in Medchal Mandal, India

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Abstract- Socioeconomic assessment and supervision require an immense quantity of information. Moderately huge capacities of multi-disciplinary and scientific data have to be composed, progressed, analyzed, and ultimately communes of population data. Socio and environment communication have been foremost unease in urban region in that combined with socio economic and geospatial research to resolve the quandary. Geospatial techniques have been experiential to have an impending systematic assessment for the study of human activity on Medchal Mandal. Interpolation and choropleth analysis of Geospatial methodology used in this research paper. The Choropleth maps exhibit the Medchal (Urban), Gundlapochampalle, and Dabilpur regions are well developed due to good connectivity of infrastructure, remain villages have to be developed by the connection of networks with quantitative represent. Interpolation analysis shows spatial spreading sheets without numerical values. This research executes the Medchal Mandal human population increases rapidly consequently major change undergone profound such as household population, literacy, employability, infrastructure development. NH44 highway connected villages are developed with good infrastructures, remain not developed, by this study we suggested that the government initiates mobile education, higher education institutes, and small-scale industries in villages Muraharipalle, Gosaiguda, Maiserreddipalle, Konaipalle, Shahajadiguda, Somaram, Ghanpur, Suthariguda, Railapur, Yadaram, Bandamadharam, Muneerabad, Nuthankal, Girmapur, and Yellampet for healthy development.

Keywords – Census, Choropleth maps, GIS, literacy survey, household survey, employability

I. INTRODUCTION

Socio-economic data consists of sophisticated categories such as census data, economic and administrative activities. Census data emphasize population in numerical or graphical mode, yielding the data in gender, region, religious and age parameter [2]. Every individual data is described in spatial distribution and elaborated density, showing the relationship between composition, dynamics, and migration. Social data comprise human workability, unworkability, education, qualification, and behavior [42] [38] [1]. Economic and administrative data emphasize the import and export of goods, the trade market, private and government services, industries, infrastructure, and development [4]. Merging of socio-economic data and remote sensing leverages suitable administrative works that include different types of thematic maps such as household choropleth map, literacy choropleth map, illiteracy choropleth map, and children population choropleth map. [7] [9].

Sustainable economic growth, professional business development, education and public organization require Monitoring for sustainable socio economics and exhibit quality of life [16] [31]. Remote sensing and GIS techniques are essential sources to preserve data, enhance, resolve, obtain accurate information, and transfer information globally. High-resolution images are widely applicable to socio-economic surveys [10] [15] [16]. Grouser shops, government offices, temples, hospitals, schools, houses, roads, private offices bonding with Geo-tagging, This information aid to segregate tax, levy a tax millage rate, manage traffic rules, find out damages of telephone lines, roads, drainage, and canals of government and private sector [37] [24] [19]. Feasible accessibility has comprehended the socio-economic data linking with spatial techniques and the scale of administrative units [31] [23] [22].

Medchal Mandal is located in the northern part of the Medchal-Malkajgiri District in Telangana State. The Mandal lies between North latitudes 17° 42' - 17° 50' and East longitudes 78° 22' - 78°45'. Medchal Mandal has 18 Village Panchayats and 29 villages. This Mandal is bounded on the western side by Qutbullapur Mandal, on the northern side by Tupran Mandal, on the southern side by Malkajgiri Mandal and eastern side by Shamirpet Mandal (Fig.1). It has an average elevation of 602 mts and the geographical area is 196.3 sq. km with a population (2011Census) of 93102. Rice, grape, and maize are crop plantations in this Mandal. The normal rainfall is 835.7mm.

Rain drained from the southwest monsoon region covers the area between June and September months. It starts from the north Kerala State and touches Rayalaseema and after that reaches the Hyderabad regions. Hence, the study area had dry climatic conditions due to the hot summer. In the Medchal Mandal most of the area is being increasingly converted into real estate with its proximity to the outer ring-road of the Hyderabad. Current land prices in Medchal are 1429, 83, 65,752 ₹ (31, 42, 46,772.72 US\$ per square meter) and there has been a shift from grape to vegetable cultivation [28].

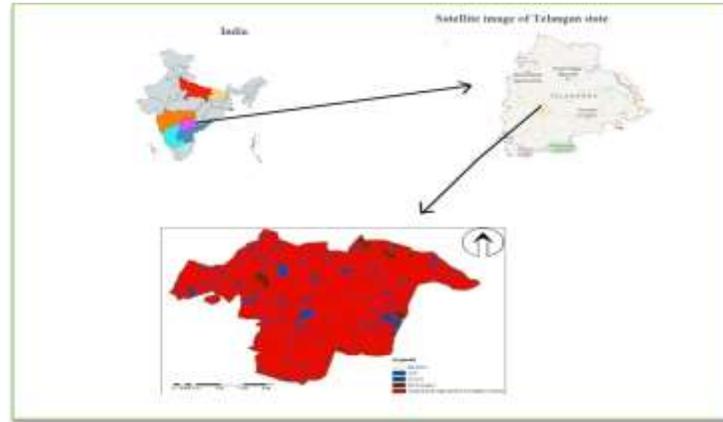


Figure: 1 Location map of the Medchal Mandal, Telangana, India

The water crisis is critical in the villages those residing on the outskirts of the Medchal Mandal and in rural parts of Medchal-Malkajiri District [43] [47]. In more than 15 Mandals, the water levels have dropped by more than five Meters below ground level (MBGL) in Telangana state. The drop is at over 11 meters in Shahbad Mandal and the suburban areas of Medchal Mandal have 6.5 meters. Medchal Mandal is generally plain and gently sloping towards the northwest. The elevation of the area in general ranges from 420 – 640 m above mean sea level (MSL).

Medchal Mandal has 110 industries such as pharmaceutical, paints, iron, plastic, ceramic, wooden, aluminum, fabrics, soaps, mobile manufacturing, glass, cold storage, food packaging industries, fertilizers, and electrical industries, Kistapur, Medchal urban, Gundlapochampalle, Maisammaguda, Kaziguda, and Goudavalle villages have major and minor industries. Medchal Mandal has good transportation facilities like National Highway and outer ring road for that the raw material can move in various states very fast.

The annual growth rate of population in Medchal Mandal

Medchal Mandal population in the year 2001 is 68,253 and 2011 is 93,425. Every decade Indian government calculates the population [11, 12] [36], for population density, and the sprawl of population over a decade, for which the best method is arithmetic expansion coexisting log process. rD means assume regional growth constant percentage rate [27] [13]. Last decade census data (2001) is divided by 2011 census data. Medchal Mandal population increases from 2001 through 2011. Highest population villages are Medchal (35611), Gundlapochampalle (9009) and Dabilpur (5398).

$$rD \text{ for decade of growth} = (1 + rD) = 93425/68253 = 1.37$$

$$\text{Therefore } rD = (1 - 1.37) = -.37 = 37\%$$

The average annual growth rate over the decade

$$\text{Log}(1 + rD) (1/n) = (1.37) .10$$

$$=.10 * \log 1.37$$

$$=.10 * 0.1367$$

$$=0.01367$$

Annual growth rate (rA)

$$(1 + rA) = n^{1/n} [(1/n) * \log(1 + rD)] = 1.01367$$

$$1 + rA = 1.032$$

$$rA = 1.032 - 1, rA = 0.032$$

$$rA = 3.2\%$$

II. METHODOLOGY

High-resolution sensor images are IRS_P6 LISS-III (5.8 m) used to study for the spreading of census data in Medchal Mandal. several spatial techniques currently provided the information of urban-suburban data. The satellite image has

been digitized from the Semi-automatic classification plug-in tool. The digitized color image represents FCC (False colour composite), which contains bands such as Red, Green, and Blue. Satellite image overlapped on the vector village map (Fig. 2). Census of Medchal Mandal data was collected from Ranga Reddy District Census 2011. The village wise population data of Micro-soft Excel inserted into the software. In a sheet of excel first column the Latitude and the second column the longitude (Fig. 3). Comma-separated values (CSV) format is saved after that opened in Q-GIS and in spatial analysis menu XY coordinates are selected (Fig. 4). Browse the Excel sheet, and this file on WGS 84 Geographical coordinate is added (Fig. 5). The values of the Mandal map census are opened (Fig. 6 and 7).

A map that contains population density in a shaded or patterned to the measurement of statistical variables is called the choropleth map [20,21]. In a geographical area, different variables are visualized in the choropleth thematic map to estimate the variables efficiently at the regional level. Indicators of socio-demographic variables are mapped based on the total area administrative sections using the choropleth mapping technique leading to a distorted notion for urban planning purposes.

III. RESULTS AND DISCUSSION

GIS software has an interpolation tool to analyze population data of Medchal Mandal. Choropleth maps such as households, literate, illiteracy, children working, nonworking people, and Total Population, are categories for good understand the socioeconomic qualitative study. These divisions are combined with Interpolation, IDW and reclassified.

Households living nature are a part of human life for functioning the protection of childhood and minor groups. One or more people living in a house who also share food, money, water. [5]. Being single and lonely creates several psychological problems for individuals, but in a household environment, these problems are reduced. In a family with older adults, children and adolescents get good care and guidance from them. Indian culture is the best example of household nature with more families in society taking care of old age people like the grandfather, grandmother, and family relatives. The Mandal contains 21,890 households (Table. 1). Medchal village has the highest number of habitations at 8604 and the lowest region is Muraharipalle 70. The highest number of households in the villages with numerical percentages are in Kandlakoya (26%), Yellampet (26%), Muneerabad (26%) and Akbarjapet (26%), while the lowest households are in villages Ghanpur (18%) and Atevelle (20%).

Interpolation method divided the households data into 6 divisions, first division contains the green color, it covers a major portion of the villages are Yadaram, Muraharipalli, Raja bollaram, Akbarjapet, Ghanpur, Gosaiguda, Somaram, Suthariguda, Konayapalli, Maiserreddipalle (Fig. 8). The second division has 500-1500 households with dark blue color, villages are Kandlakoya, Muneerabad, Pudoor, Rawalkol, Shahajadiguda, Yallampet, Dabilpur, Grimapuram, Nuthankal, Railapuram, Sreerangavaram, and Gaudavalli. The third division has 1500-3000 households in pink color shade, the villages are Atevelle and some part of Gaudavalli. Fourth (3000-5000), fifth (5000-6000) and sixth (6000-9000) divisions are shows in sky blue, parrot green, and yellow colors. These three divisions are part of Medchal and Atevelle villages. Choropleth map of household shows 3 classes (Fig 9). The first division contains 24 villages (70-17 77 households) second division has one village (1777-3484) and the third division comprises one village named Medchal (6397-8604 households).

Education is a good resource to change the human style and economy of living, without education society and lifestyle never grow [26]. Literacy is a mediator to transform the unqualified life to qualified life [8], and promotes human intelligence which can move well in society. Development of literacy in society from grade school, higher education, and universities play a very important role, as at each stage people learn good and quality education. That elaborates human thoughts to analyze social changes. In any home, if parents have good educational background their children also maintain the education level.

The study of books, newspapers, magazines, and journals exposes trends in and surrounding the country such as education levels, scientific changes, and global enhancement [44] [45]. Each country has a different percentage of education standards because local language dominates from childhood due to which it varies. English is one of the languages to maintain the equalization of all languages in one track, but it is difficult. Because of regional language dominance [14]. Village wise literacy shows in graphical representation Medchal (25,007), Gundlapochampalle (6,380), and Dabilpur (3,294) villages are having more literacy people compare to other villages in the Mandal.

Interpolation map to understand the total literacy population village wise. About 0-1500 educated population villages are Gosaiguda, Muraharipalle, Konaipalle, Maiserreddipalle, Shahajadiguda, Somaram, Suthariguda, Yadaram, Bandamadharam, Railapur, Raja bollaram, Muneerabad, Nuthankal, Ghanpur, Gimapur, and Yellampet. These villages are covered under a dark brown shade. The division of 1500-2500 educates people in green color

shade. Villages are Kandlakoya, Sreerangavaram, Ravalkole, Atevelle. The third division has a blue color shade which has a 2500-5000 educated population. The villages are Pudoor, Goudavelly, and Dabirpur. The fourth division contains 5000-25000 and yellow color shade villages are Gundlapochampalle and Medchal (Fig. 10).

The choropleth literacy map has three divisions based on the population of literacy. The first division has the lowest educated people (156 - 4298). In this division around 23 villages covered in dark red shade. The second division of moderately educated people (4298-8440). Gundlapochampalle village is under moderately educated division. It is covered in dark brown shade. The third division contains a well-educated people (20865-25007) in Medchal village only, it shows low red color (Fig.11). These divisions are easy to understand the lowest educated population of villages and well-educated population villages. In low literacy areas, the government has to build education institutions.

Rural areas and urban areas demonstrate considerable variation in education, and consequently economic development. To provide an equal level of education across both these regions is a major challenge to governments. [46] [39]. Non educated people always reckon on educated people [3] [25]. Technological learning is quite different since it is a continuous learning process. It changes constantly so people keeping in touch with technology is more important. In the future, noneducated people will suffer more [6] [18]. Now the trend is converting into digitization so it should have basic terminology even in this stream, represents the village wise illiteracy population in Medchal Mandal.

The total illiteracy of the Medchal Mandal is divided into 4 categories. The first category contains a 0 to 1000 population. These villages are Muraharipalle, Gosaiguda, Maisireddipalle, Konaipalle, Shahajadiguda, Somaram, Ghanpur, Suthariguda, Railapur, Yadaram, Bandamadharam, Muneerabad, Nuthankal, Girmapur, and Yellampet. The Second division villages contain 1000-1400 population which are Atevelle, Kandlakoya, Raja bollaram, Sreerangavaram. The third division represents 1400-1900 people under villages Pudoor and Goudavelly, while the fourth division contains 1900-2500 population in which the villages are Dabilpur, Ravalkole, Gundlapochampalle, and Medchal (Fig. 12).

Illiteracy choropleth illustration of the Medchal Mandal population represents 2 divisions. Both divisions have a similar color. The first division shade covers around 24 villages with a population is 131-3622. The second division color shade is covered in a little dull shade of the first division. The second division population is 7113-10604 (Fig. 13).

Working people in Medchal Mandal are 38,247. The main source for the working of people is cultivation, industries, business, and labor. Male domination is high in the working environment and the female working environment and possibilities are less [33] [35]. The working population in Medchal Mandal contains 6 divisions as per choropleth analysis. The first division has 0-1500 people and it shows a grey color. The second division has 1500-3000 people and it shows a pink color. The third division has 3000- 4000 and it shows parrot green color. The fourth division has 4000-5500 people and it shows a sky blue color. Fifth division people are 5500-10000 and it shows a dark green color. Sixth division people are 10000-12000 and it shows a dark blue color. Seventh division people are 12000-22000 and it shows a dark blue color. The representation working people interpolation map is well developed in the center portion. Good development is shown in the northern and eastern directions, and western direction showing less improvement [34] [29]. In the southern direction, somewhat good development has shown (Fig. 14). Medchal region and Kistapur areas have an industrial belt due to which people have migrated and settled in these regions. Kajiguda and Gundlapochampalle have higher education institutions providing good employability to local people. Some villages have well-cultivated land which is another source of survival for people in villages.

Spreading of the unemployability in Medchal Mandal represents (Fig 15). In that, the first division is occupied unemployability 0-1500, the second division unemployability is 1500-3000. The third division unemployability is 3000-4000. Women and old age people mostly are not working, and few conditions men also do not work in villages [48] [40]. Medchal village (10,604) has the highest number of unemployability and Gosaiguda (151) village have the lowest unemployability in Medchal Mandal. Medchal urban and adjacent villages have a high population of nonworking people. Based on this, the data provides clear information about the decreasing economy. The government must promote small scale industries to resolve this situation and improve entrepreneurship and employability [30] [41].

Children population in Medchal Mandal contains 6 divisions. The first division has 0-500 people and it shows a grey color. The second division has 500-1000 people and it shows a pink color. The third division has 1000-1500 and it shows parrot green color. The fourth division has 1500-2000 people and it shows a sky blue color. Fifth division people are 2000-3000 and it shows a dark green color. Sixth division people are 3000-5000 and it shows a dark blue color (Fig.16). Ravalkole (358), Pudoor (237), and Gundlapochampalle (205) villages are children population high in Medchal Mandal. In this category of Medchal Mandal and adjacent villages, the children's

population is good because of the children's hospitals, Medchal government hospital, dundigal government hospital, medciti hospital. Perhaps northeast regions and northwest areas not having good hospitals at the same time due to a lesser population.

Village wise total population in Medchal Mandal is represented in Fig. 17. It contains 7 divisions. The first division has a dark blue color and a total of 12 villages under this division. The second division contains 12 villages with pale green color. The pink color of the third division has Medchal (35,611), Gundlapochampalle (9009), Dabilpur (5398), Goudavelly (4651), and Ravalkole (4723). The remaining 4 divisions are under Medchal village only. Choropleth map of village wise total population in Medchal Mandal has 4 categories. In this division, all villages are in a single color but within that shades varies. The first division has 314 to 3844 population under 19 villages. The second division has 3844 to 7373 population in 4 villages. The third division contains one village the population between 7373 to 10903. The fourth division has 32081 to 35611 population in one village Fig. 18.

IV.CONCLUSION

The research analysis with the gathered data of the survey confirms that to understand the socio-economic combined with remote sensing and census, this study is desirable and beneficial to villages or communities. Geographical information systems combined with census surveys help to understand the population spread, population decrease and increase, and information on growing children population, working groups, non-working groups, literacy, and illiteracy of the area. Census data is a good resource to analyze various aspects of the area and can help plan systematic development and fruitful administration. Medchal Mandal socio-economic survey explains the village wise population, literacy data, illiteracy data, working, and non-working population and children population.

Spatial spreading sheets give clear eye-catching information on the socio-economic data. Choropleth map explains village wise household data in a clear view. Southwest and the center of the villages have a good development in compare to other villages. The highest population of villages in Medchal Mandal are Medchal (Urban), Gundlapochampalle, and Dabilpur. These three villages are connected to NH44. In the future all the villages which are connected National Highway to demonstrate good development due to NH44. Suggestion from in this study, that the government initiates mobile education, higher education institutes, and small-scale industries in villages Muraharipalle, Gosaiguda, Maisereddipalle, Konaipalle, Shahajadiguda, Somaram, Ghanpur, Suthariguda, Railapur, Yadaram, Bandamadham, Muneerabad, Nuthankal, Girmapur, and Yellampet for healthy development.

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Table 1 Socio-economic Survey of Medchal Mandal, Medchal-Malkajgiri District, Telangana State

	No_HH	TOT_P	P_LIT	P_ILL	TOT_WORK	TOT_CL	NON_WORK
Medchal (Urban)	8604	35611	25007	10604	13336	117	22275
Gundlapochampalle	1936	9009	6380	2629	3359	205	5650
Dabilpur	1265	5398	3294	2104	2249	200	3149
Goudavelly	1088	4651	2862	1789	1947	203	2704
Ravalkole	1046	4723	2288	2435	2188	358	2535
Pudoor	943	4072	2577	1495	1645	237	2427
Sreerangavaram	768	3241	1858	1383	1446	102	1795
Kandlakoya	717	2802	1639	1163	1324	28	1478
Atevelle	704	3535	2472	1063	1300	97	2235
Yellampet	635	2422	1448	974	1194	82	1228
Girmapur	514	2098	1241	857	990	188	1108
Raja Bollaram	503	2186	981	1205	945	154	1241
Muneerabad	467	1790	1037	753	840	96	950
Nuthankal	465	1867	1077	790	890	69	977
Railapur	310	1346	789	557	565	168	781
Bandamadharam	309	1338	713	625	717	113	621
Ghanpur	301	1703	1194	509	686	117	1017
Suthariguda	286	1127	594	533	569	13	558
Yadaram	265	1226	610	616	458	34	768
Somaram	183	790	368	422	393	60	397
Shahajadiguda	148	668	312	356	292	2	376
Maisireddipalle	111	450	257	193	227	54	223
Konaipalle	93	406	209	197	235	82	171
Akbarjapet	84	323	162	161	159	20	164
Gosaiguda	75	329	156	173	171	67	158
Muraharipalle	70	314	183	131	122	22	192
Total	21890	93425	59708	33717	38247	2888	55178

No_HH= Number of Households, TOT_P=Total Population, P_LIT= Literacy Population, P_ILL= Illiteracy Population, TOT_WORK= Total working for population, TOT_CL= Total Child Population, NON_WORK= Nonworking population

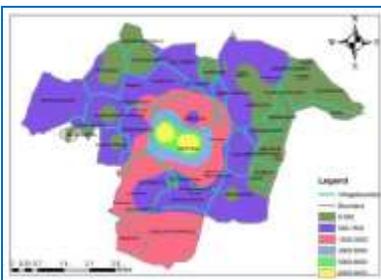


Figure.8 Interpolation household map of Medchal Mandal, Telangana State

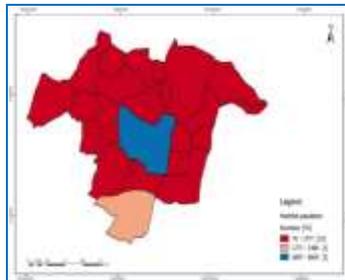


Figure.9 Choropleth Household map of Medchal Mandal, Telangana

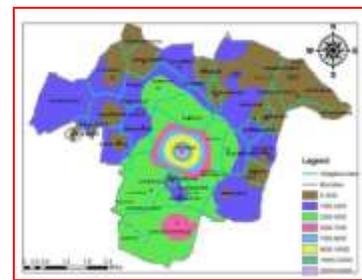


Figure.10 Interpolation literacy map of Medchal Mandal, Telangana State

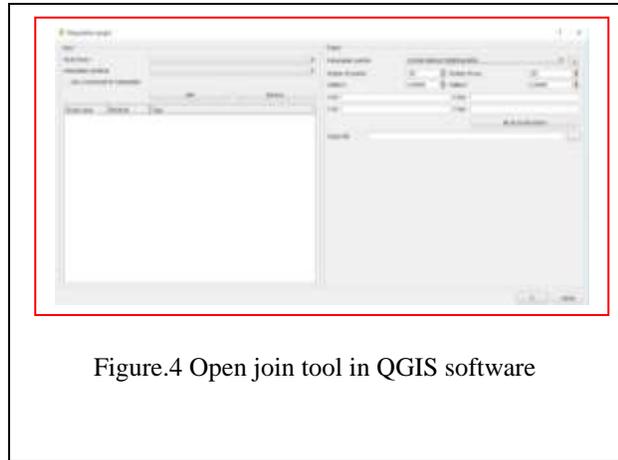
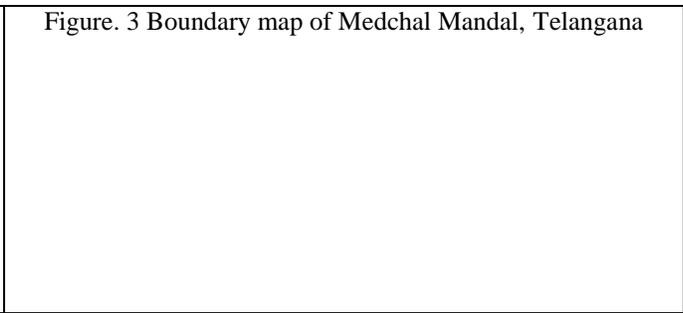
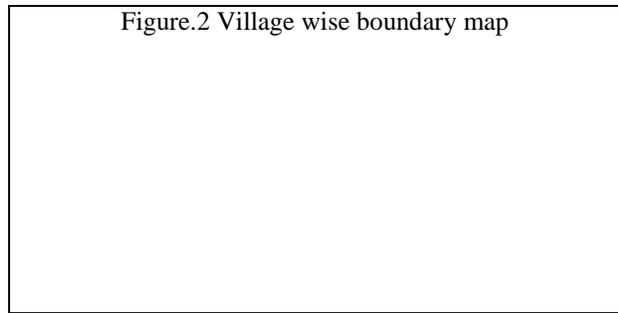


Figure.4 Open join tool in QGIS software

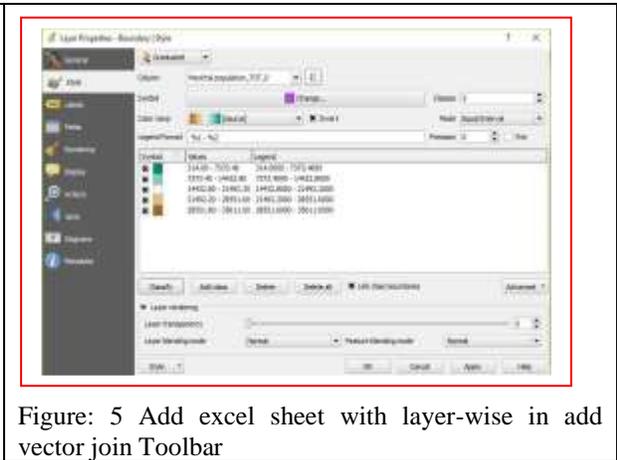


Figure: 5 Add excel sheet with layer-wise in add vector join Toolbar

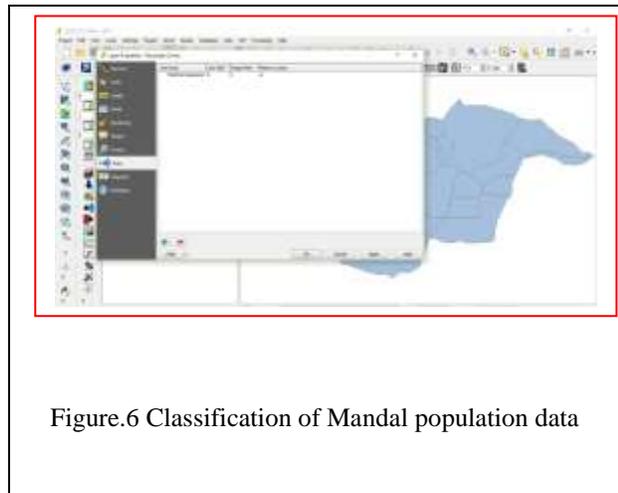


Figure.6 Classification of Mandal population data

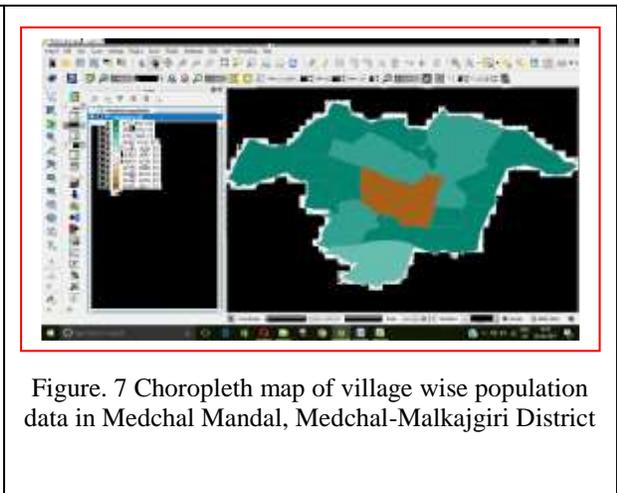


Figure. 7 Choropleth map of village wise population data in Medchal Mandal, Medchal-Malkajgiri District