

**SOCIO-DEMOGRAPHIC AND SPATIAL INTER-RELATIONSHIP OF LARGE  
SIZE VILLAGES AND ALL URBAN CENTRES IN GUJARAT  
STATE - 1961**

by

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Submitted in Partial fulfilment of the requirement for the  
degree of Master of Population Studies.

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to the best of my knowledge, his original work and  
may be placed before the examiner for evaluation.

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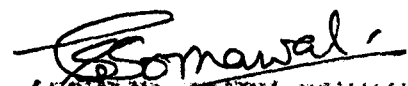
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(GOVIND SINGH SOMAWAT)

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I N T R O D U C T I O N



The spatial distribution of urban centres and large-sized villages in Gujarat is the subject matter of our study. The concept of "urban" and "village" used here are those which have been used in the Census studies (1). It has been commonly held that all urban places are "villages which succeeded": however, this is not quite true, for many urban centres did not begin their lives as villages. Moreover, it is insufficient to look upon the growth of urban centres as merely "villages which succeeded" owing to some fortuitous circumstances. The growth of urban centres have a distinct pattern of relationships with the growth and development of the rural settlements and also other entraneous economic activities e.g. maritime trade. It is these spatial relationships - geographical and socio-demographic-which exist between the large-sized villages (pop. above 5,000) and all the urban centres in Gujarat, which comprises the sphere of investigation of this study.

The work done in this field appear to be inconsiderable, although some geographers and economists have worked on allied (topics (2). The aim of this study is to find out the level and rate of growth of urbanization, to classify all settlements on a functional basis, and to find out the sex-ratio, the literary rate, the dependency ratio and population density.

There are certain characteristic features which determine the spatial distribution of the settlements. These features are the type of crop-region, soil quality, rainfall, river and streams, climate extent of forested area, availability of social amenities, the sex ratio corresponding to the different levels of settlement intensity and the agricultural growth rate. We shall examine in this study, each of these features and examine the manner in which they have determined the spatial distribution of the settlements.

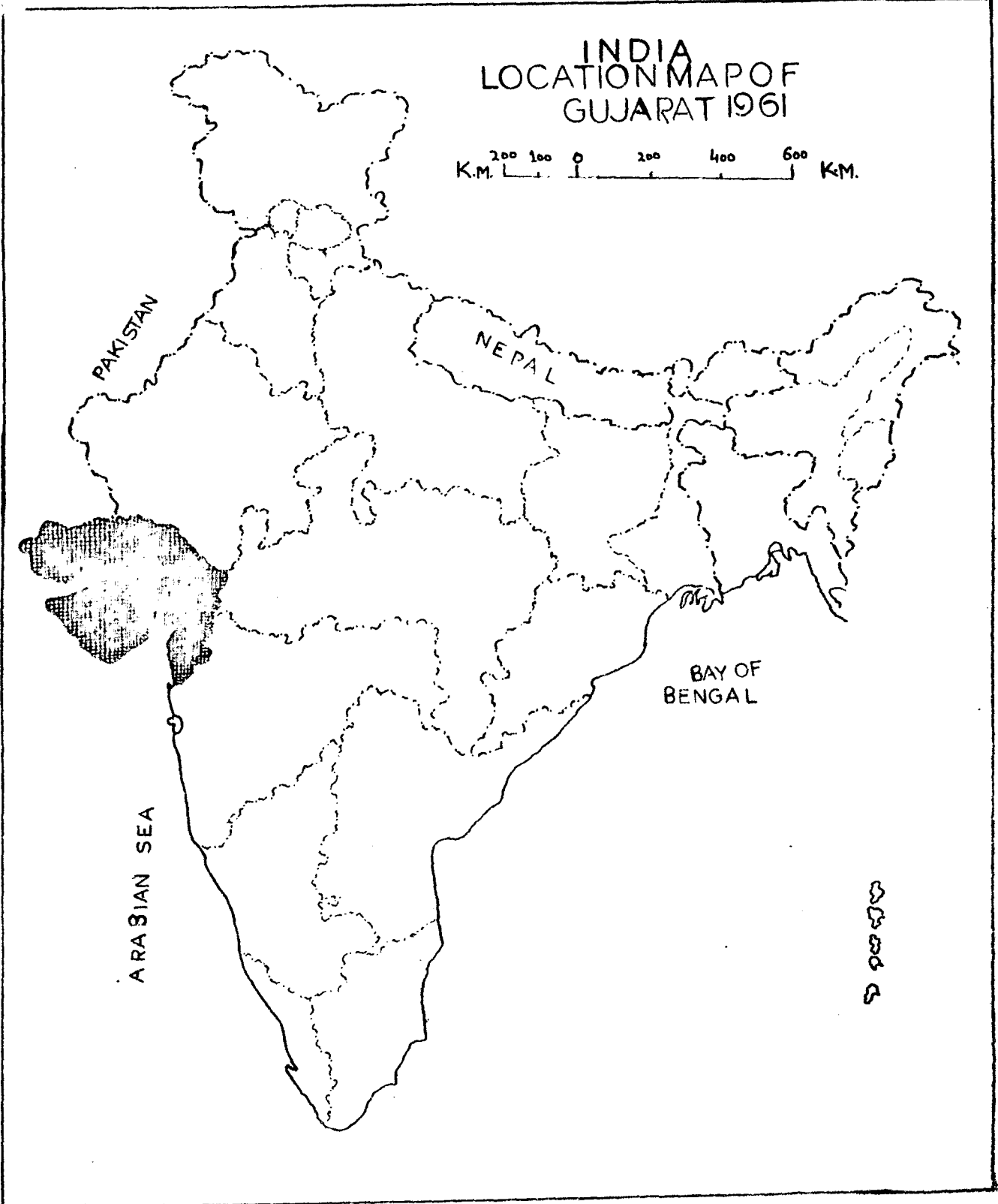
For this study all necessary data have been obtained from Census records and District Census Handbooks of Gujarat for 1951, 1961 and 1971. The study is mainly based on 1961 data. Data has been collected for all the urban centres and all large-sized villages ( i e having a pop. greater than 5,000), on the following aspects:

- (i) Distribution of workers in nine industrial categories separately for males and females.
- (ii) Literary rate, total area of the settlements and the total number of non-workers.
- (iii) The available social amenities in the settlements.
- (iv) The status of towns in 1951, 1961 and 1971 and the downward and upward revision in their size-class status, if any, as per the Census.

A complete list of the books, journals, and various government publications and publications of other

INDIA  
LOCATION MAP OF  
GUJARAT 1961

200 100 0 200 400 600  
K.M. L. K.M.



PAKISTAN

NEPAL

BAY OF  
BENGAL

ARABIAN SEA

INDIA

non-government agencies which have been consulted in doing this study has been appended at the end of the dissertation in the form of a bibliography.

Gujarat lies in the Western part of the Republic of India. Originally, it was a part of the former bilingual state of Bombay, which was subsequently on 1st May, 1960, divided into the two states of Maharashtra and Gujarat, under the states Re-organization Act XI of 1960. Gujarat is situated on the West Coast of India between Latitudes  $21^{\circ}10'$  N and  $24^{\circ}7'$  N and longitudes  $68^{\circ}.4'E$  and  $74^{\circ}.4'E$ .

Gujarat accounts for 5.97 per cent of the total area of India and 4.87 per cent of her population. The state-wise figures of urban population, for 1961, show that with 26.88 per cent people living in urban areas, Gujarat ranks third amongst all the states of India; as regards the urban - rural population: distribution; Gujarat is ranked ninth in population-wise and seventh area-wise. Gujarat is bounded by Maharashtra on the South and South-West, by Madhya Pradesh in the East, Pakistan in the North-West and Rajasthan in the North and North-East. An important feature of Gujarat is its long coastline, the longest compared to any other state in India (3), which plays an important role in the economy and social organization of the people inhabiting the state.

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Gujarat comprises of seventeen districts, subdivided into 185 Talukas/Mahal covering an area of 184,035 square kilometres.

We shall examine certain important features of Gujarat, which define the resources and the potentiality for development of the state. These features are:

- (i) Physical Conditions
- (ii) Geological features: minerals and other natural resources.
- (iii) Rainfall and the quality of the soil .
- (iv) Drainage

We shall take up these features separately:

(1) Physiography:

The state can be divided into two main geographical divisions, viz. (a) Mainland Gujarat, (b) Peninsular Gujarat and (c) Kutch.

(a) Mainland Gujarat:

Mainland Gujarat comprises of the valleys of Sabarnati, Mahi, Narmada and Tapti rivers which flow from East to West, into the Gulf of Cambay.

The Aravalli Ranges with altitude of 150-319 metres above sea level, run to the North and extend in the South till the right bank of the Narmada. In the East, the 150-243 metres high Vindhya<sup>M</sup>s form the water-divide between the Tapti and Narmada, and separate the state from the Khandesh tract of Maharashtra. Salt marshes, sandy belts and gravel patches mark the topography of the coastal regions which occur as a strip running along the length of the Gulf of Cambay, and are not more than 25 metres above sea level. The flat and fertile plains have an altitude of between 25 and 75 metres above sea level.

(b) Peninsular Gujarat:

Peninsular Gujarat is conspicuous in relief on account of its low hills, with an average altitude between 75-150 meters above sea level and with alternating tiny alluvial basins. The Sourashtra coastal region which comprises Peninsular Gujarat is not uniform in its physical features.

(c) Kutch:

The Kutch district is formed out of a vast expanse of tidal mud flats and is flecked with saline efflorescences. This region has the lowest annual rainfall in Gujarat.

(ii) Minerals and Other Natural Resources:

Gujarat is rich in minerals such as limestone, manganese ores, bauxite, calcite, china-clay, fine-clay and also produces large quantities of common salt from brine. There exist no mining centres for coal and iron. Mineral deposits in the state are mainly concentrated in Jamnagar, Rajkot, Amreli, Kutch and Junagadh districts of Peninsular Gujarat and in Paucharahal, Baroda, Thaira and Sabarkantha districts of Mainland Gujarat. Gujarat has important petroleum deposits and the Ankeleshwar, Kalol and Nawagam oilfields are among the most important in the country.

(iii) Rainfall:

In the Southern region of Gujarat, rainfall is quite heavy, ranging between 120 and 250 cms. per annum, while it diminishes towards the Northern parts, where it is as low as 50 cms. per annum. The highest rainfall is in relatively thickly forested Dangs district, while it is lowest in the Kutch district.

(iv) Soil:

The distribution of settlements appear to be largely on the basis of soil regions. The basic complex of the state (4) consists of volcanic rocks, except for the Aravalli plains of Northern Gujarat and the West Borders of

Sourashtra peninsula. The soil of Gujarat have been formed by the alluvium brought down by the big rivers which have their origin outside the state and to which they owe their fertility. On the basis of soil characteristics, the state may be divided into five regions. The classification into the different soil regions is done by aggregating the various districts according to what type of soil predominates in the individual districts.

The following Table gives the distribution of various size-class settlements amongst the five different soil regions.

**Table 1.1** Distribution of Settlements according to the Soil region in the Gujarat State.

Sr. No.	Soil Region	Class I Towns	Class II Towns	Class III Towns	Class IV Towns	Class V Towns	Class VI Towns	Vill -age	Total No. of settlements	%age of total settlements in the soil region
1.	Desert Sandy Saline Soil	1	1	12	11	12	1	31	69	22.3
2.	Alluvium Sandy Soil	-	-	4	-	7	-	-	11	3.5
3.	Alluvium Sandy Foam Soil	1	2	9	9	8	-	52	81	25.9
4.	Medium Black Soil	2	4	13	23	20	7	23	92	29.4
5.	Deep Black Soil	2	2	5	11	13	-	27	60	18.9
6.	Total	6	9	43	54	60	8	133	313	100.0

**Source:** This table has been compiled from the Districts Census Handbooks of Gujarat - 1961.



(a) Desert Sandy Saline Soil:

This type of soil is mainly found in Kutch, Banaskantha, Mehsana and Jamnagar districts. The soil once formed, is retained, distributed and eroded, depending on the surface configuration of the region. The wide range of soil-forming factor which are operational in the state, produces a variety of soils. The region extends from the South of Gujarat with its heavy rains to the arid and semi-arid parts of Kutch and Banaskantha, from the ill-drained coastal areas on the West to the mountainous border zone on the East. This soil region has 22.3 per cent of the total number of settlements in Gujarat.

(b) Alluvium Sandy Soil:

Alluvium Sandy Soil covers the major portion of the Surendranagar district, and this region accounts for 3.5 per cent of the total settlements in Gujarat.

(c) Alluvium Sandy Loam Soil:

This soil region comprises of the districts of Ahmedabad and Kaira districts. The region accounts for 25.9 per cent of the total number of settlements in Gujarat. The sandy loam soil which characterizes this region and which is locally known as "goradn" owes its origin to the Indo-Gangetic

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alluvium. This is one of the plain and most fertile parts of the state. Locally it is reputed to be the "Garden of Gujarat". In this region, the irrigation system is mainly based on wells and tanks.

(c) Medium Black Soil:

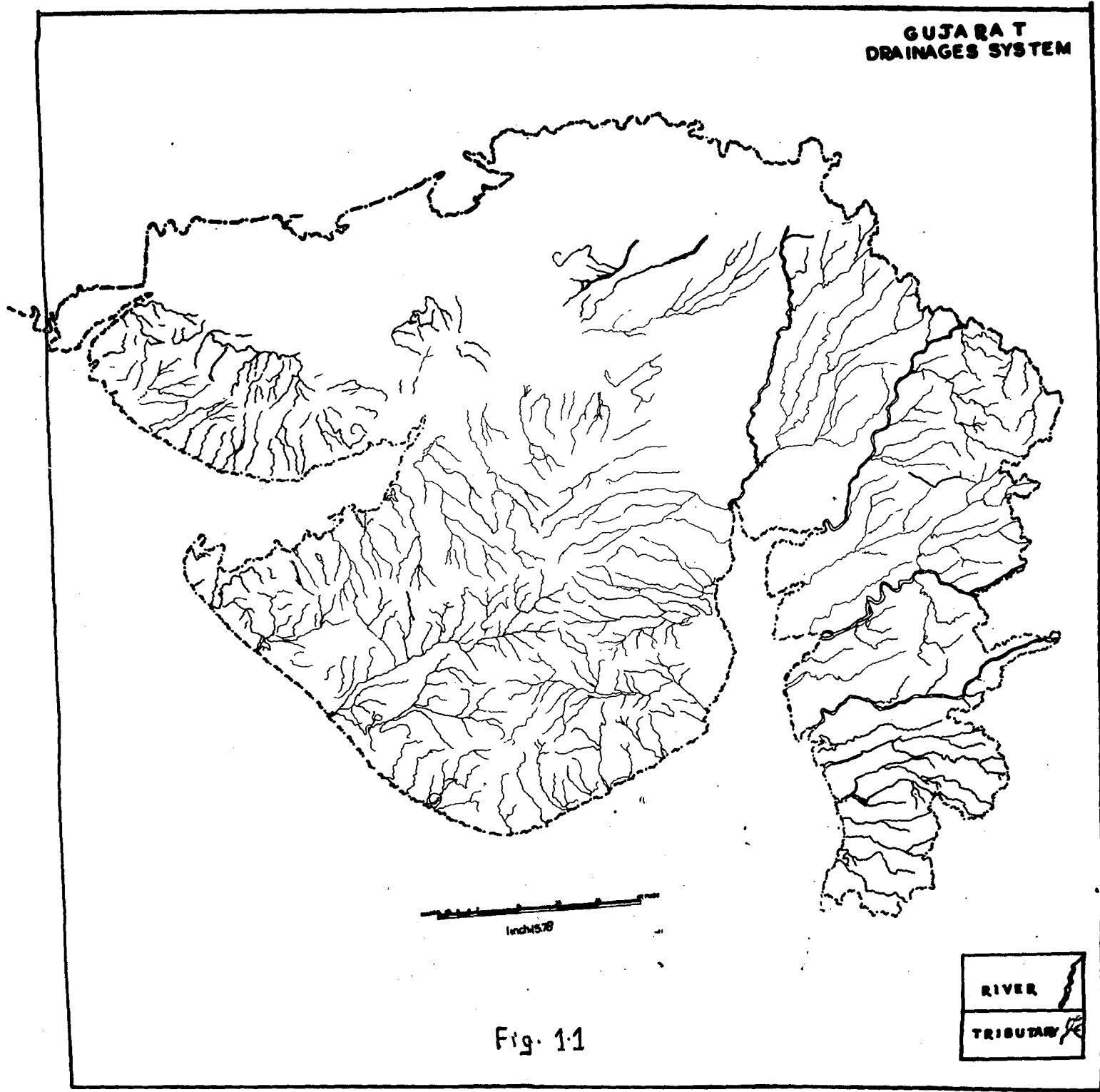
The region includes the districts of Sabarkantha, Rajkot, Amreli, Junagadh, Bhavnagar and Panch mehels. The black soils of a lighten shade is generally called Medium Black Soil. This is not as deep as the black or deep black soils and their colour is a reflection of the nature of their origin and a lower percentage of human content.

This region has the highest percentage of settlements, namely, 29.4 per cent. It also has the largest number of settlements in each size-class of town and villages. This medium black soil of the Southern parts of Gujarat is fertile and suitable for multiple cropping. It is well served by rivers and irrigation facilities.

(e) Deep Black Soil:

This region includes the districts of Broach, Baroda, Surat and Dangs. This soil is also very fertile and is eminently suitable for cotton, jowar, rice and wheat cultivation as well as for the raising of various garden crops.

**GUJARAT  
DRAINAGES SYSTEM**



The region accounts for 18.9 per cent of the total settlements in Gujarat. The rich mineral resource in this region and the resulting high number of industrial complexes, account for the existence of many of these settlements.

This soil is quite fertile and irrigation facilities exist, by way of Dams, rivers and wells. Moreover, this region has quite good rains.

(f) Drainage:

The drainage map (Fig.1.1) shows that the state is provided by some major rivers with tributaries. The drainage net work of Kutch, Saurashtra and that of the rest of Gujarat are unrelated to one another. The main rivers flowing the south have very few tributary streams. These are very small streams in the Rann which flow to the Gulf of Kutch. Mostly rivers are dry during summer, but in the rainy season they flood.

Saurashtra can be divided mainly into three major groups on the basis of river flow. From the central Saurashtra the rivers flow in all directions. The drainage in the coastal area border of Jamnagar district meets in the Gulf of Kutch then to the Arabian sea.

The Mahi and Sabarmati two important rivers which have their sources in the outliers of the Aravallis. These drain the districts of Sabar Kantha, part of Mehsana, Ahmedabad

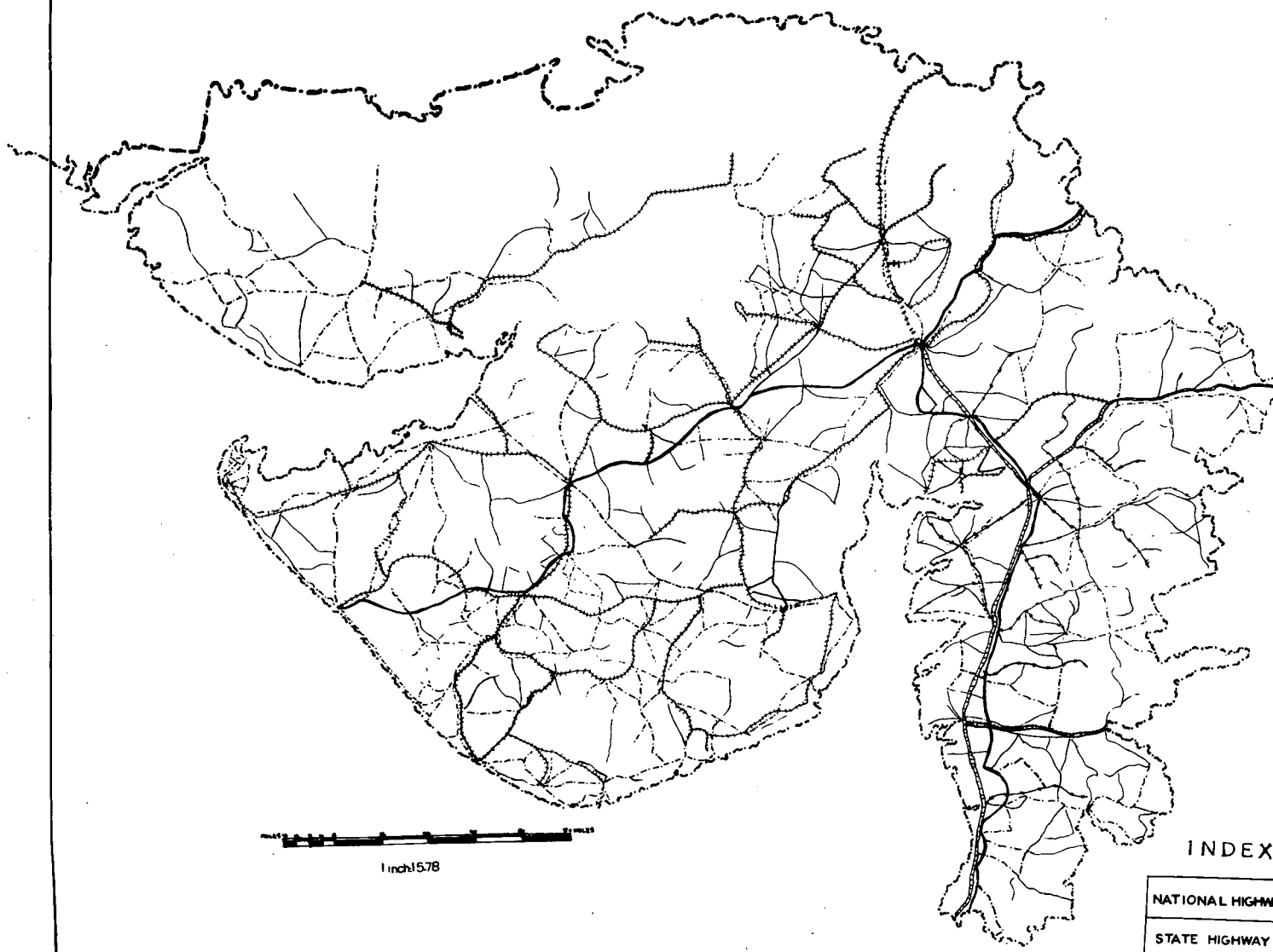
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part of Panch Mahals and Kaira. Both rivers receive tributaries in their left bank, and the land beyond a few miles on their right banks falls in the catchment of another river. The drainage characteristic of the Sabarmati and the Mahi basins can be attributed to low rainfall.

The drainage of South Gujarat as a whole is characterised by Parallal rivers flowing directly to the sea. The Narmada and the Tapi running from east to West align along the rift valleys, enter the Western coast of Peninsular India to unite with the Gulf of Cambay but the currents Generated in the Cambay wash away the silts of the Narmada and Tapi. Both these rivers of Gujarat: have large catchment areas extending over several states.

In the economy of Gujarat, her rich mineral resources have an important role to play. The State's arid and semi-arid areas have not been opened up to agriculture owing to the non-existence of appropriate irrigation canals. Due to the mineral resources and the consequent extent of industrialization, the number of registered factories and the total number of industrial work-force, in Gujarat is third after West Bengal and Maharashtra(5). The discovery and the exploitation of the Gujarat petroleum oilfields in the early '60's in particular the Ankaleswar, Kalol and Navagam oilfields, by the ONGC, have greatly

**GUJARAT  
TRANSPORTATION NETWORK  
1961**



1 inch = 57.8

**INDEX**

NATIONAL HIGHWAY	
STATE HIGHWAY	
OTHER ROADS	
METER GAUGE	
BROAD GAUGE	
NARROW GAUGE	

**Fig. 1.2**

Fig 1.2

added to the importance of the state resource - wise and has brought about the establishment of a 3 million ton refinery in the public sector and an associated petrochemical complex near Baroda.

The transport net work in Gujarat is below the all-India average and has failed to keep pace with the rate of industrial growth while the all-India average of the ratio of roads to population is 103 miles per hundred thousand Gujarat is way below with its 24304 k.m. of roads and 5335 k.m. of railways, i.e. an average of 78 miles of roads per hundred thousand of population. Marine transportation, viz. coastal shipping is of particular importance of Gujarat. The long coast line of 1650 kms. has 47 parts of which Kandla is an international port. The bulk of the transportation in the coastal areas is handled by shipping.

The transport net work map (Fig. 1.2) shows that the northern parts of the state do not have as dense a net work of roads as some of the fertile and level areas of the state. The districts of Kutch, Banaskantha and Sabar Kantha have a net work of roadways confined only to some main roads.

As far as the development of the railway-net work is concerned, Saurashtra has metre-Gauge railways, while the hilly districts of Panchmahals, and the eastern part of

Baroda, Broach and Surat have narrow-gauge railways. The Bombay - Baroda and Central India railways were opened during the British period, are broad gauge and are meant for inter-state communication.

The sparsely populated district of Kutch have few rail lines, only one metre-gauge line runs between Bhuj and Kandla.

The overall transport-system needs improvement. If the states development potential is to be realised. The individual system of transportation - Roads, Railway, Waterways and coastal shipping - have all to be improved in the right proportions so as to provide maximum benefit to the transport needs of the State.

Notes:

1. Census of India:1971, "Indian Census in perspective", Census Centenary Monograph No.1; Office of Registrar General, India, Ministry of Home Affairs, New Delhi, pp 195-198.
2. i) Deshpande C D, Western India; A Regional Geographic 1948.
  - ii) NCAER: Techno-Economic Survey of Gujarat.
  - iii) Vakil, C N and others - Economic Survey of Saurashtra; School of Economics and Sociology, University of Bombay, (1953).
  - iv) Janaki, V A "Functional Classification of towns in Gujarat", Geography research paper series, No.223, Baroda, 1966-67).



3. Dikshit K R "Geography of Gujarat" (1970)  
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5. Singh, R L (ed.) "India, a Regional Geography"  
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CHAPTER 2

SPATIAL DISTRIBUTION OF SETTLEMENTS

Spatial distribution of settlements within a region is a new methodological study in Geography. The term spatial means distance - distance and connections. For the study of spatial distribution of settlements, the following methods have been utilized:

- (i) The nearest neighbouring techniques
- (ii) The distribution of population and settlements by using the Gini Coefficient and Lorenz Curve
- (iii) Connectivity and density of the Transport net work.

The distribution of settlements over a region used be examined. The following Tables gives the general distribution of settlements in accordance with the respective regions.

Table II 2.1: Distribution of settlements according to the size and region level.

Region	No. of Dist.	Size Class of Settlements						Vill- age	Total
		I	II	III	IV	V	VI		
1. Southern	2	1	2	4	8	9	-	17	41
2. Central	4	2	3	16	17	14	-	80	132
3. Northern	2	-	-	1	6	3	-	6	16
4. Saurashtra & Kutch	7	3	3	21	20	32	8	22	109
5. Eastern	1	-	1	1	3	2	-	8	15
<b>Total</b>	<b>16</b>	<b>6</b>	<b>9</b>	<b>43</b>	<b>54</b>	<b>60</b>	<b>8</b>	<b>133</b>	<b>313</b>

The Table clearly shows that Saurashtra and Kutch regions have the highest number of districts and except for the village - category, contain the largest number of settlements. The Saurashtra and Kutch region has also one more spacial characteristic: All the class VI settlements are located in this region. The Central Gujarat region has the highest number of village settlements. Northern and Eastern Gujarat with two and one district each respectively, have the lowest number of settlements, and both these regions lack class I cities.

Nearest Neighbour Technique:

The nearest-neighbour technique have been applied to measure the quantitativity distribution pattern at the district level. The nearest distance (NND) is considered as a straight line measurement of the distance separating any location in space from its nearest neighbour in space. This technique was used for the first time by Clark and Evans in tracing out the pattern of distribution of various plant species over the surface.<sup>1</sup> Subsequently the technique was found suitable in identifying the spacing among the settlements and has been used

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1. Clark, P J and Evans, F C: "Distance to Nearest Neighbour as a measure of Relationship in population", Ecology", Vol. XXXV (1954); pp. 445-54.

GUJARAT  
NEAREST NEIGHBOUR DISTANCE

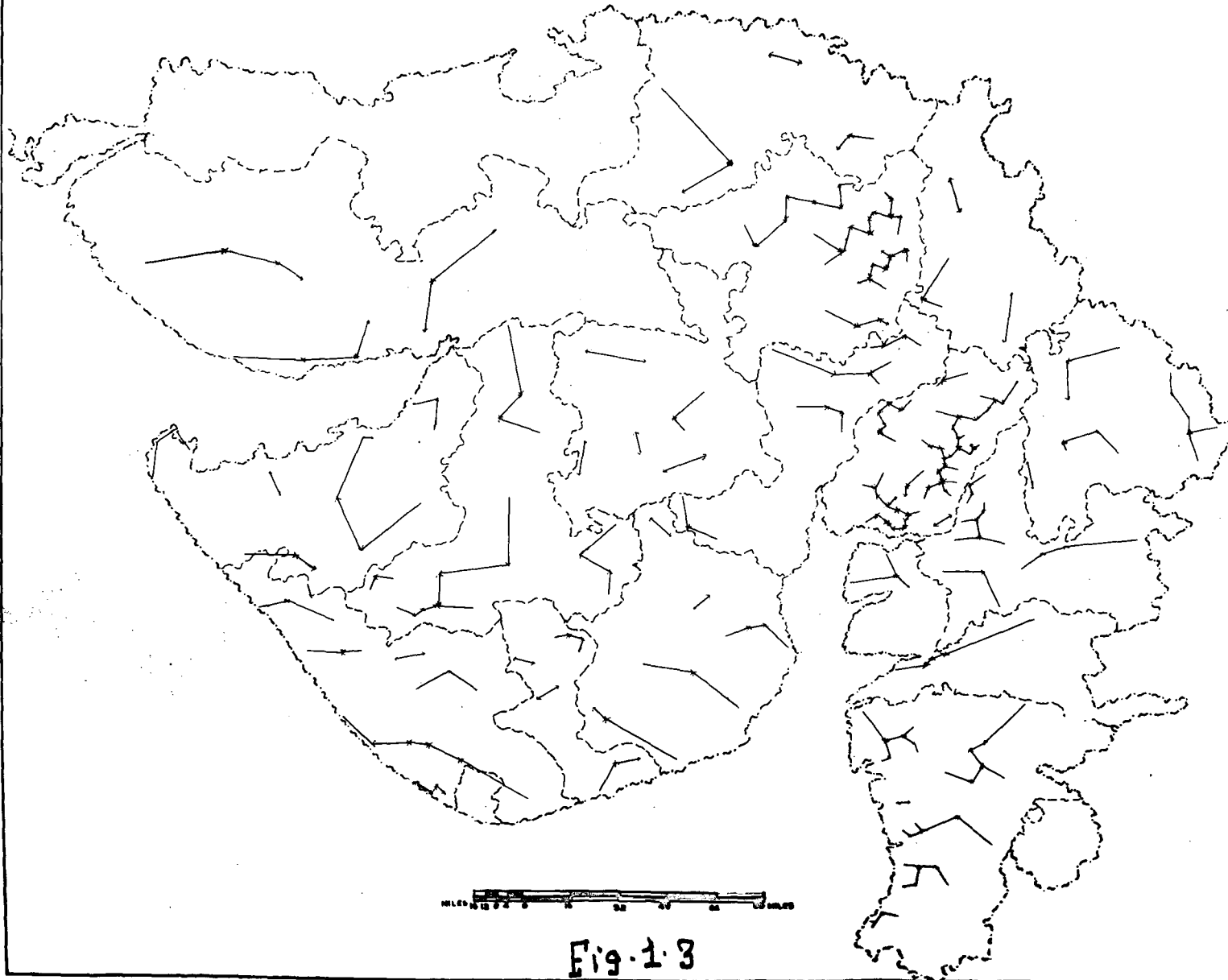


Fig 1.3

for the purpose by Decay<sup>2</sup>; King<sup>3</sup>; Thompson Browing and Gibb's with the help of Nearest Neighbour distance technique.

### Methodology:

All the settlements plotted on the map measure the straight line distance of Nearest Neighbour settlements. With the help of N.N.D. the departure from observed spatial distribution to a theoretical pattern of settlements have been identified and denoted with the help of 'R' Scale.

The 'R' value has been calculated from the following formula:

$$'R' = \frac{\bar{r}_a}{\bar{r}_e}$$

where  $\bar{r}_a$  is the mean of observe distance in a given region  
 $\bar{r}_e$  is the mean of the expected distance which can be obtained by the following methods:

$$\bar{r}_e = 1/2 \sqrt{P}$$

$$P = N/A \text{ or } \frac{\text{total number of settlements}}{\text{Total Geographical area.}}$$

The nearest neighbour distance which is concerned as the shortest physical distance between two points. The ratio of  $\frac{\bar{r}_a}{\bar{r}_e}$  which is termed as the nearest neighbour statistic  $R = \frac{\bar{r}_a}{\bar{r}_e}$

2. Decay M. F; "An Analysis of Central Place and Point Pattern by a NND Method" Human Geography (Series A of Land studies in geography) Vol. XXIV (1962): pp.55-75.
3. King; L J; "A Quantitative Expression of the Pattern of Urban settlements in selection areas of U S" Analytical Human Geography (Ed. P.J. Ambrose). London; Longmans, 1966; pp-89-102.

an index to measure the degree to which any observed distribution deviates from a distribution which might be expected if the points were distributed randomly within the same area.

The 'R' Value range from 0 to 2.15 scale as follows:

R Value range	No. of Districts	Pattern of Distribution	Average Persons Density of per sq. mile
1	1	Clustered	740
1.00 - 1.50	8	Random	389
1.50-2.15	7	Uniform	266

The distribution of districts according to the 'R' value or settlements distribution pattern is given in the above table. It can be seen that one district (Kaira) has 'R' value less than 1 and it shows the cluster pattern of settlements.

Eight districts (Surendranagar, Amreli, Sabar Kantha, Mehasana, Ahmedabad, Panch Mahals, Baroda and Broach) have random distribution pattern of settlements. Broach, Baroda and Surendranagar districts have a more regular distribution pattern than the random distribution. (To see table No. 2.1).

Seven districts (Jam Nagar, Rajkot, Bhavnagar, Junagadh, Kutch, Banas Kantha and Surat) have a uniform distribution pattern. Surat, Rajkot and Junagadh districts have distribution

\* Source: Census of India 1961, General Population Tables, Gujarat pp 35-36.

pattern more random than the uniform. (To see table No.2.1)

It is observed from the table that average density of persons per square mile decreases with the change in the settlement pattern from clustered to the uniform distribution, in the region.

**(B) Measures of Population and settlements Concentration**

The degree of concentration is greatest where a population is assembled at one point; and least where it is evenly distributed within the region. This concentration also gives some picture of urbanization and economic developments. Generally measures of population concentration may be regarded as measures of the dispersion of unit densities about the overall density.

The method of measuring the population concentration and settlements used is the Lorenz Curve, which gives the concentration of population. We considered two variables for the population concentration: (i) District population (ii) The districts population of study units (all urban centres and pop. 5000 and above villages). We arranged accordingly the higher to lower percentage of population to the districts population. Then totalled the cumulative percentage of both populations' (i) Total state population to the district population and (ii) Total population of study unit to the total study unit percentage of districts. Cumulative percentage of total districts population are (Y - axis) are plotted against cumulative percentage of

POPULATION DISTRIBUTION OF URBAN CENTRES  
AND VILLAGES 5000 & ABOVE IN  
GUJARAT 1961

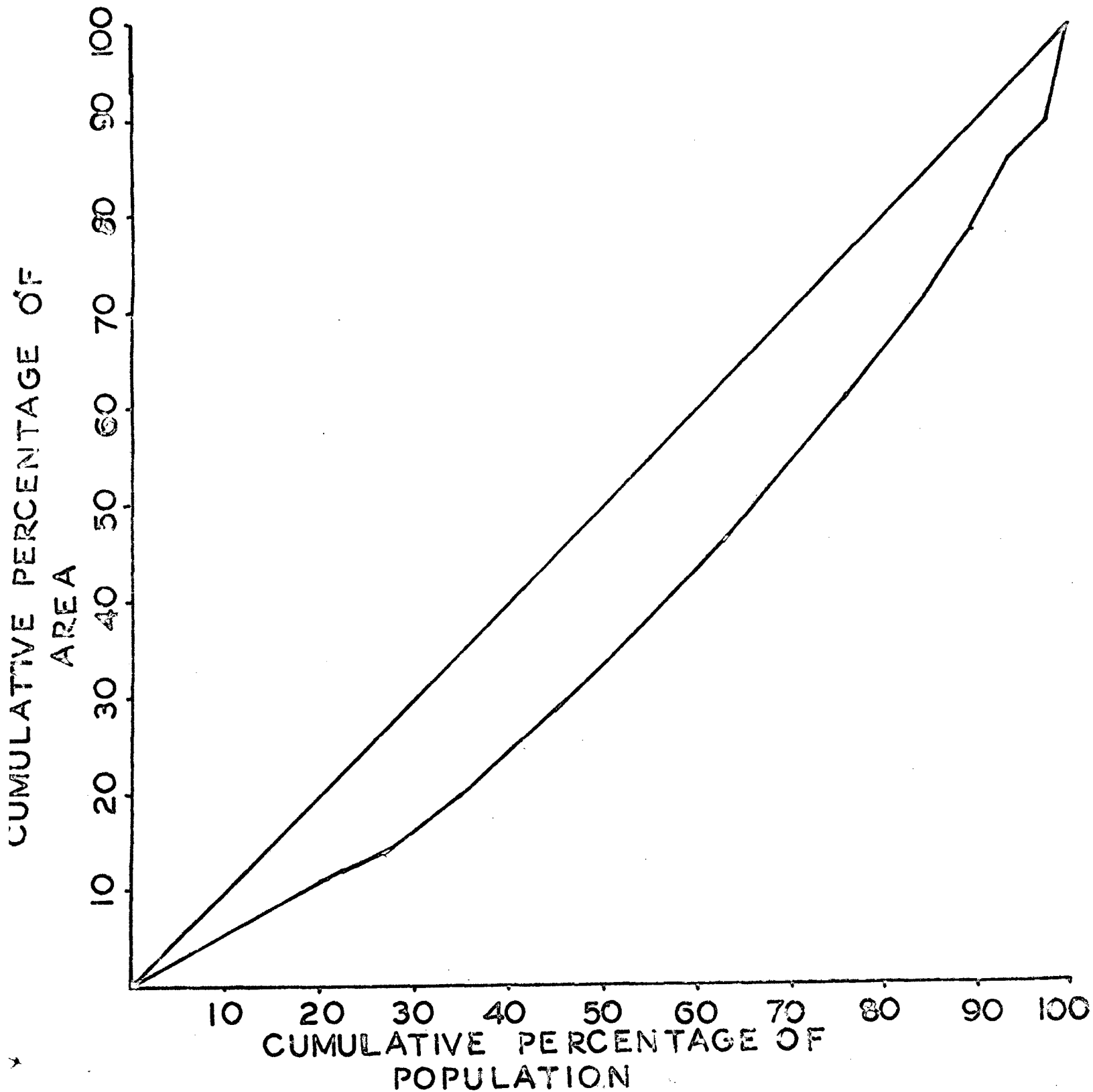


Fig. 1.5



DISTRIBUTION OF SETTLEMENTS  
BY LOUREZ CURVE

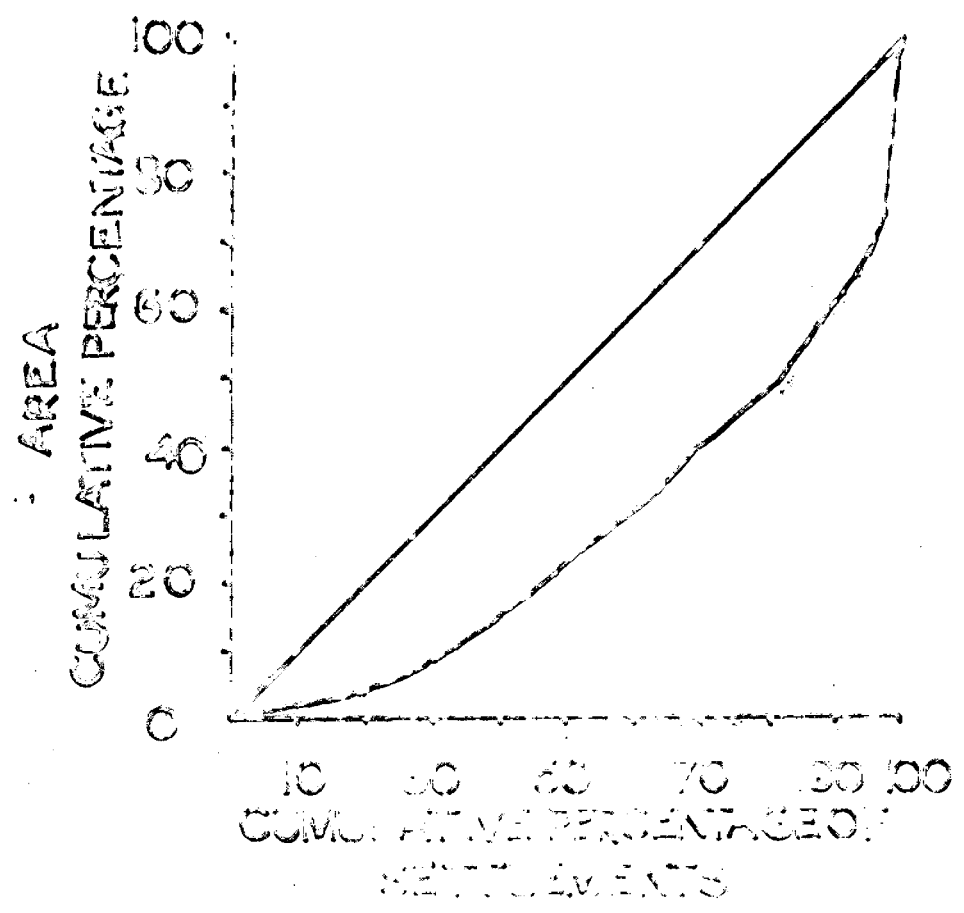


Fig. 1.6

study unit - population (X-axis). If the population is an even distribution and all districts have similar densities, in this case the curve follows the diagonal. On the other hand, if the population is concentrated at one point, then the curve coincides with the X-axis.

The slope of the tangent of the curve of concentration at a point gives a measure of the density of that state. The Lorenz Curve of population concentration of Gujarat State (Fig. 1.5) shows that within the state population distribution (study unit) or concentration ratio is random. The Lorenz Curve of settlements concentration (Fig.1.6) shows that all the urban centres and large sized villages are uniformly distributed.

#### Gini Concentration Ratio:

Gini's Co-efficient is also a method to measuring the concentration of population as well as settlements. For Gini's method those results which are calculated for Lorenz Curves are used. We have to use two further steps.  $X_1$  and  $Y_1$  cumulative percentage values are cross multiplied (see table No.2.2). Then these cross multiple values are added and with the help of the following formula we calculated the Gini's concentration.

$$G = \frac{1}{10000} [\sum X_i Y_{i+1} - \sum Y_i X_{i+1}]$$

where:  $\sum X_i$  is the cumulative percentage of total population of districts or (total settlements of districts)

$\sum Y_i$  is the cumulative percentage of total study settlements population of district or (total areas of districts)

For Population = The  $X_i$  and  $Y_i$  figures is taken from the table No.2.2 which calculated

$$\begin{aligned} G &= \frac{1}{10000} [\sum X_i Y_{i+1} - Y_i X_{i+1}] \\ &= \frac{71505.34 - 68928.35}{10000} \\ &= 0.2576 \end{aligned}$$

For settlements concentration:

The  $X_i Y_i$  and  $Y_i X_i$  figures is taken from the Table No. 2.3 and which is calculated:

$$\begin{aligned} G &= \frac{1}{10000} [\sum X_i Y_{i+1} - \sum Y_i X_{i+1}] \\ &= \frac{53090.04 - 48576.31}{10000} \\ &= 0.4513. \end{aligned}$$

The Co-efficient 'G' values varies from 0 to 1 from minimum to Maximum evenness. As the values from zero to increase the concentration ratio also increases. In case of population concentration of study settlements the calculated 'G' value is

Y,33;<sup>DISS</sup> 7:7.4436<sup>N61</sup>

L7

G-39364

DISS  
307.7095475  
So51 So  
  
G39364

# GUJRAT

VILLAGES WITH POPULATION 5000+  
& ALL URBAN CENTRES  
1961



**INDEX**

SETTLEMENT SIZE SYMBOL	
METROPOLITAN CITIES	[Large Square]
1 LAKH TO 4.99 LAKHS	[Medium Square]
50,000 TO 100,000	[Small Square]
20,000 TO 50,000	[Vertical Bar]
10,000 TO 20,000	[Horizontal Bar]
5,000 TO 10,000	[Small Circle]
LESS THAN 5000	[Small Circle]
VILLAGES	[Small Circle]

Fig. 1.4

0.2572. It shows that population is more evenly distributed. The distribution of settlements in the study area have less concentration and its coefficient is 0.4513.

(iii) Spatial distribution of settlements according to the Transport Net Works

It is well known that marked changes in rural life as well as urban were brought about by the emergence of rural and urban transportation systems. It is now necessary to predict marked changes in urban areas which will follow the current development of transport facilities. The net work expressed in topological terms; that is specifying that a place exists wherever a junction, railway station, national highway, state highway exists or a route terminates. The routes joining settlements are the link. The transport net work map (Fig. 1.2) superimposed on the settlement map (Fig. 1.4), gives the connectivity of settlements with the roads and railways. For the connectivity and importance of transport facilities we give arbitrary values to get a composite index of connectivity for individual settlements.

The values which are arbitrarily given for the study on the basis of importance of facilities -

	<u>Facilities</u>	<u>Values</u>
1.	Broad Gauge Junction	8
2.	Metre Gauge Junction	4
3.	Broad Gauge station	2
4.	Metre Gauge station	1
5.	National highway	4
6.	State highway	2
7.	Other roads	1

A general notion of connectivity may be obtained from the following formula:

$$C.I = xw + xv^1 + xv^2 + xv^3 \dots xv^n$$

C.I = Connectivity Index of Individual settlements

x = function

w = weightage

These transportation facilities are available within the settlements, and we give the weightage value of each facility. We then add all the weightage values according to the facilities of each individual settlement. This value gives the connectivity of a settlement.

Table No. II: 2.4 Connectivity Index of Settlements:

Sr. No.	Connectivity	No. of Settlements	Percentage to the total number of settlements.
1.	0	37	11.81
2.	5	219	69.96
3.	5-10	49	15.65
4.	10-15	6	1.91
5.	15 and above	2	0.64

It is observed from the above table that 11.81 per cent of settlements does not have any transport facilities, because the connectivity index value is zero. The highest value of 79.96 per-centage of settlements have a connectivity index value of less than 5. Only 0.64 per cent of settlements have a connectivity index more than 15.

One feature which the Table makes prominent in the general law connectivity index for the bulk of the state. It quantitatively expresses the general paucity of road and railway networks, the backwardness of the existing facilities and underlines the need for speedy development of further transport facilities. The transportation net work is after all essential to the commodity flow mechanism and seriously effects the regions development and the migration stream.

The distribution of settlements according to the transport net work facilities are as follows:

Table II 2.5

Net work Facilities	Total No. of Settlements	Percentage to the total Settlements
1. Broad Gauge Junction	4	1.27
2. Meter Gauge Junction	29	9.26
3. Broad-Gauge station	29	9.26
4. Meter Gauge station	93	29.71
5. National Highway	35	11.18
6. State Highway	124	39.58
7. Other roads	158	50.47
8. Not on railways	137	43.77
9. Not on railways and roads	9	2.87

The above table shows the spatial distribution of settlements with the transport net work facilities. The highest number of settlements are along the other roads and is 50.47% of total settlements, 43.77 per cent of settlements are not along the railways; state highway having the 39.58 per cent of settlements along them. This is the second to "other roads" connectivity facility of settlements in Gujarat region. The Broad Gauge Junction metre gauge junction and Broad Gauge stations are having very few facilities for settlements.



Only 2.87% of settlements do not have roads and railway lines in the Gujarat state.

Mostly the transport net work facilities are provided on the basis of demands and the importance of settlements or the area. Roads and railways play an important role in the distribution of settlements within the region and outside the region. So that the settlements and density of Transport net work have some relationship which is calculated with the help of following table.

Table II: 2.6: Road and Railway Distribution in Gujarat (km.)<sup>1</sup>

Name of districts	Total No. of Settlements	Total length of Roads	Metal- led Roads	Unmetta- lled Roads	Total length of railway
1. Ahmedabad	20	1446	771	675	382
2. Amreli	14	1326	842	486	303
3. Kutch	10	1989	510	1479	200
4. Kaira	61	1304	904	400	341
5. Jam Nagar	19	1441	1063	351	389
6. Junagadh	22	2069	1112	957	406
7. Dangs	0	624	256	368	505
8. Panch Mahals	15	450	946	204	254
9. Broach	9	920	668	252	218
10. Banaskantha	8	665	517	148	252
11. Bhavnagar	14	1791	729	1062	360
12. Mehsana	33	947	623	364	411
13. Rajkot	19	2133	1141	992	440
14. Baroda	18	1590	687	903	108
15. Sabarkantha	8	853	587	266	533
16. Surat	32	2680	1295	1385	375
17. Surendranagar	11	1361	489	872	358

1. Source: Basic statistic of Gujarat, 1963.

The above table gives the distribution of settlements and the length of railways and roads. On the basis of the above data we calculate the correlation matrix table which is as follows:

Table No. II: 2.7 Correlation Matrix

	Settle- ments	Road Length	Metal Roads	Unmetal roads	Railway
Settlements	1.0000	0.5317	0.5020	0.0443	0.2936
Road Length		1.0000	0.5561	0.2734	0.6036
Metal Roads			1.0000	0.4380	0.8901
Unmetal Roads				1.0000	0.3015
Railways					1.0000

The above correlation matrix index shows that higher number of settlements have higher density of metal roads and the correlation co-efficient for metal roads is 0.5020 and railways is 0.2936. The higher number of settlements in the district have a lower non-metalled roads density and its correlation coefficient is 0.0443.

Metal roads and railways are highly positively correlated and its co-efficient is 0.8901.

CHAPTER 3DEMOGRAPHIC CHARACTERISTICS OF GUJARAT  
STATE - 1961

The objective is to study and focus attention on the manifold demographic aspects of large sized villages and urban centres in Gujarat in 1961. The demographic characteristics play an important role in the social as well as the economic development of a region. The present study is mainly confined to the sex-ratio, growth rate, density, literacy and dependency ratio.

Methodology:

The following methods are used in this study:

(1) Growth rate:

For deriving the growth rate the following formula is used:

$$G.R. = \frac{P_2 - P_1}{P_1} \times 100$$

Where  $P_1$  = population size at a point of time.

$P_2$  = population size at a later point in time.

**(ii) Density:**

The density is calculated as follows:

Total area of settlements is divided by the total population of that settlement. It gives the density of population in the settlements.

**(iii) Sex Ratio:**

The Indian Census define sex ratio either as the number of females per thousand males or the number of males per thousand females. For this study, the first definition - Number of females per thousand males, has been considered.

**(iv) Literacy:**

The term literacy is a relative term which differs in meaning from nation to nation. In this case literacy is defined by the Census of India. . person who can neither read nor write or can merely read but cannot write in any language is to be treated as illiterate, otherwise literate. (Census of India, 1961, p.157). Literacy rate is calculated by using this formula:

$$LR = \frac{\text{Total number of literate persons in settlement}}{\text{Total number of persons in settlement}} \times 100$$

(v) Dependency:

Dependency ratio is calculated by dividing the total number of non-workers by number of total workers and then multiplied by 100. It gives the dependence ratio.

Not all persons who fall in the independent age group of 15-60, are necessarily independent. Likewise, some people who fall outside this age group, are however independent of complete picture of the dependence burden of given population can only be got, if one takes into consideration all these anomalous cases.

2.

1. The distribution of settlements according to Size-class and demographic aspects:

This paper is mainly concerned with five demographic aspects; growth rate, density, sex ratio literacy, dependency ratio and this section also includes the percentage of Agricultural Workers to the total workers and the analysis of demographic aspects according to the size classes of settlements.

However, before one proceeds ~~before~~ ~~can~~ hypothesis to be listed in the Gujarat state is as follows:

- (i) Large sized towns have a higher growth rate, higher literacy percentage with low sex and dependency ratios.

(11) In case of smaller sized towns and large sized villages the reverse should hold time.

Table 3.1: Distribution of Settlements according to size groups:

Sr. No.	Class of Towns	Average GR 1961-71	Sex ratio per 1000 males females	Average literacy rate	Average Dependence rate	Average Agricultural workers to total %age of workers
1.	I	39.15	889	52.51	71.47	1.28
2.	II	36.78	926	50.42	71.98	4.01
3.	III	34.86	893	43.76	69.78	11.24
4.	IV	32.37	926	42.75	68.25	17.58
5.	V	25.47	1026	38.55	64.42	25.04
6.	VI	22.64	927	33.80	64.28	33.20
7.	Village	25.06	940	37.20	64.15	48.66

It is observed from the above table that the growth rate of settlements is increasing along with the size of settlements except for class VI settlements which have a lower growth rate as compared to the villages. Sex ratio fluctuate with the size of settlements. The National average for sex ratio in the urban areas is 845 females per 1,000. But in Gujarat state the average of sex ratio is higher than National (urban) average. The average sex ratio for the state as well as

national is moreover same. The class VI settlements have a literacy rate even lower than that of the villages. This is in large parts because of the type of settlements which characterize this class. Thus, out of the eight class VI settlements, three (umrate, vishod, lillia) have a population of agricultural workers which constitute more than 50 per cent of the total, one (Tankara) is a predominantly manufacturing town, Beyt and Viechia are predominantly trading and commercial town and only two towns Talala and Dungar, specialize in services. All these factors determine the class VI settlements literacy rate. The literacy percentage is also higher than average stage level and average state level literacy is 36.19 per cent.

The table shows that as the size of settlements increases the dependency rate also increases along with the size. In the case of Agricultural workers to total workers quite the opposite results are obtained in the Gujarat region. In the case of dependency rate results quite opposite to that of our hypotheses, is indicated in this study. This is generally because the dependency rate is higher in villages and smaller sized towns than the larger sized towns. But it is not thus observed in Gujarat state. This is due to the disguised unemployed surplus agricultural labour in villages,

moreover our census operations were made in the month of March and since it is the harvesting time, many people are engaged as workers, although they face seasonal unemployment and are thus dependent. This affects the dependency rate in villages.

It is observed that large sized towns have a higher growth rate, high literacy percentage with low sex ratio and dependency rate.

High growth rate in large sized towns is due to the great extent of immigration from rural settlements to urban settlements and also smaller urban areas to large sized towns. Due to facilities of employment and better opportunities and some extent of towns merged in big cities and it increases the growth rate.

Growth rate:-

This class wise distribution of growth rate gives some picture of <sup>The</sup> state. Growth rate plays an important role in the economic as well as social development.



**Table 3.2: Growth rate percentage and size of settlements  
Gujarat Region:**

Sr. No.	Size of Settlements	Negative Growth rate	Less than +15% GR	15-30 +	30-45 +	45-60 +	60-100 +	100+ above	Total number of Settlements
1.	I	-	-	1	2	3	-	-	6
2.	II	-	-	5	2	1	-	1	9
3.	III	-	6	15	14	3	2	3	43
4.	IV	-	11	16	10	14	2	1	54
5.	V	2	22	17	13	5	-	1	60
6.	VI	-	4	3	-	1	-	4	8
7.	Village	2	31	56	26	12	3	3	133
	Total	4	74	113	67	39	7	9	313

The above table shows that four settlements have negative growth rates, Ranpur in Ahmedabad, Kathana in Kaira, Jankedorana in Rajkot, Angath village in Baroda district. Generally, negative growth rate settlements have higher sex ratios due to the immigration of menfolk. The negative growth settlements have an average sex ratio of 944 females per 100 males. This sex ratio is more than state and national average per in 1961. If we considered less than 15 per cent positive growth rate for settlements then the above statements have more solid support. Then except for eight settlements (Palitana, Gandhidham, Ghogho, Kunthiyana, Vapadvanta, Adas and Deval) all of the rest settlements have sex ratio more than the state and

national average. We can, therefore, say that the growth rate and sex ratio have an inverse relationship in Gujarat state.

The distribution of settlements according to the Growth rate and size class of settlements shows that (see table No. 3.2) except for class VI settlements which do not have a distribution, otherwise all other class of settlements have a good distribution of growth rate in the state.

Nine settlements have growth rates more than 100 per cent. These settlements are Dhari (Amreli) Sikka (Jannagarh), Mahula, Kapadvanj (Kaira), Patan Mehsana), Bayat (Sabarkantha), Udhana (Surat), Gandhidham, (Kutch), and Shahpur (Ahmedabad). The Sikka settlement has come up in 1961, as a town and in 1971 it merged in Jannagar cities. This area covers the major portion of the labour force resident in Jannagar city and it affects the growth rate of this settlement. Udhana is also a new town and its growth rate is high due to the Udhana irrigation project.

The relationship between the growth rate and sex ratio in these nine settlements, has less than national and state average except Patan settlement. By super imposing the settlements map (Fig. 1.4) with transport map (Fig. 1.2); we find that all the above settlements have the highest growth rate are along side the national highways and railways excepting Gandhidham which is due to a seaport of Gujarat.

Density:

The population density shows the population pressure on the land. To some extent, on the basis of density distribution, within the region one can say something about the development of region. The density of population plays an important role for the distribution of settlements. The density is one of the important - demographic aspects for the study. Distribution of density and size of settlements is as follows:

Table No. 1.3 : Distribution of Settlements according to the density and size of settlement in Gujarat region, 1961.

Sr. No.	Size of Settlements/ Class	Total No. of Settlements	500 persons per Sq. k.m.	500-1000 sq. k.m.	1000-1500 sq. k.m.	1500-2000 sq. k.m.	2000-3000 sq. k.m.	3000-4000 sq. k.m.	4000 +above sq. k.m.
1.	I	6	-	-	-	-	-	-	6
2.	II	9	-	-	-	-	-	1	8
3.	III	43	-	-	-	1	3	4	35
4.	IV	54	-	2	4	1	6	7	33
5.	V	60	2	8	9	5	8	6	22
6.	VI	8	-	1	-	-	1	2	4
7.	Village	133	21	63	42	20	27	23	117

From the above table it is clear that 21 settlements have less than 500 persons per sq. k.m. Out of them two settlements are in the class V type and nineteen settlements are villages

It shows that 133 out of them, 71 villages are not fulfilling the urban definition criteria in Gujarat region; otherwise rest of the villages fulfilled the density criteria. Two class five settlements are not competent for the criteria of urban status in Gujarat region.

It is observed that for all settlements sizes class the density of the population is 4,000 persons and above per sq. km. except villages. There are 117 settlements which comes under this group. This range of density covered almost 37 per cent of the total settlements. The lowest number of settlements lies in the range (1500-2000 persons per sq. km.).

#### Sex Ratio:

The sex composition of a population is the basic one out of all demographic characteristics and it affects directly the incidence of births, deaths, marriages and migration rates. The occupation structure and virtually all other population characteristics may be influenced by the sex ratio. Sex structure is conveniently described by series of 'sex ratios', in the 1961 Census in Gujarat as follows:

**Table 3.4** Distribution of Settlements according to the sex ratio and size of settlements in Gujarat Region 1961.

Sr. No.	Size of Settlements	Less than 850	850-900		900-950		950-1000		1000 + above		Total Number of Settlements
		Females per 1000 males									
1.	Class I	1	1	4	-	-	-	-	-	6	
2.	Class II	-	1	7	1	-	-	-	-	9	
3.	Class III	4	5	20	8	6	-	-	-	43	
4.	Class IV	5	8	15	22	4	-	-	-	54	
5.	Class V	5	7	13	21	14	-	-	-	60	
6.	Class VI	-	-	1	6	1	-	-	-	8	
7.	Villages	9	33	37	21	28	-	-	-	133	
8.	Total	24	60	97	79	53	-	-	-	313	

**Analysis:**

The sex ratio of Gujarat is 940 females per 1000 males practically the same as that of India which is 941. As a part of the Curious pattern found to emerge on either side of the latitude 22° with the sex ratio appreciably lower north of that latitude than south of it, Gujarat, which is situated on that latitude takes a middle position among the states.

The table No. 3.4 shows that 53 settlements having a sex ratio of more than 1,000 females per 1,000 males is found

in contiguous areas Kutch and in the coastal belt of rural and in isolated areas in Rajkot, Mehsana and Sabar Kantha districts. No class I and class II settlements occur in this range of sex ratios in Gujarat.

(ii) Male emigration

Sex ratio is affected by the male emigration in Kutch, Mehsana, Sabar Kantha and Surat districts settlements. Except Surat District other districts have an inferior type of soil and inadequate rain fall, the major crop is jowar. These factors play a role in migration of menfolk out of these areas.

It is observed from the table that 24 settlements have the lowest sex ratio of less than 850 females per 1000 males and for 60 settlements it is less than 900. 97 settlements have a sex ratio of between 900 and 950 females and this is the highest number of settlements for all ranges of sex ratios.

If we compare the urban sex-ratio with that of the national average, then we find that twenty-four out of the three-hundred and thirteen, fall below the national average. For the sex-ratio as a whole, one hundred and eighty one settlements in the state are below the national average.

The distribution of villages according to sex ratio have some relationship with the urban centres because the distribution of villages are all in the frequency range of sex ratio groups.

The causes of low sex ratio to some extent in the Gujarat state is as follows:

- (i) Sikka and Bodihas been merged into Jamnagar city. Gandhidham and Okla are ports and it affects the male labour force structure, Atwa, free land ganj, Ahmedabad, Anand, Sakroli and a major number of settlements are industrial towns and they have the majority of the labour force and thus affected their sex ratios.
- (ii) One more important factor also determines the sex ratio particularly in India is applied that especially females are under inumeration in India.<sup>2</sup> It is also applicable for the Gujarat State.

#### Literacy Analysis:

Literacy is one of the most important characteristics of the demographic aspects. Literacy plays a major role in the Socio-economic development of the state and also of the country as a whole. Gujarat state has a high literacy rate and it

stands next to Kerala state. The distribution of settlements according to the literacy in Gujarat is as follows:

Table No. 3.5: The distribution of Settlements according to literacy and size of settlements in Gujarat-1961

		(Frequency of Literacy %age)							
Sr. No.	Size of Settlement	Total No. of Settlements	Less than 20%	20-30	30-35	35-40	40-45	45-50	50 and above
1.	Class I	6	-	-	-	-	-	2	4
2.	Class II	9	-	-	-	-	-	5	4
3.	Class III	43	-	-	2	5	11	13	12
4.	Class IV	54	1	1	1	13	11	16	11
5.	Class V	60	-	3	15	10	12	9	11
6.	Class VI	8	-	2	4	2	-	-	-
7.	Villagon	133	10	20	21	21	22	27	12
8.	Total	313	11	26	43	51	56	72	54

The distribution of settlements according to literacy, shows above table that the total number of settlements is increasing alongwith the percentage of literacy. Only in one case in the 50 column above), total number of settlements not increasing with the literacy percentage in the percentage but in the contrary decreasing. The table shows that the distribution of settlements is good and incase of villages there is a far better distribution.



Eleven settlements have less than 20 per cent literacy. Because Badi settlement had urban status and of all the rest of the settlements have rural status. Badi was merged into Jamnagar city in 1971. This was completely slum area and poor labour class residence. Therefore this settlement has a low literacy rate. If we see the transport net work map then we find that the Mehsana, Panchmahals, Banas Kantha and Rajkot districts, settlements have no facilities of transport, only Kaira districts' settlements have good facilities and are along with the national highway roads. It shows that the development of the transport net work and literacy have a positive relationship.

The major concentration of settlements is in the two range groups (45-50 and 50 and above). The highest literacy percentage of more than 50 per cent is found in 54 settlements. Except for few villages all these settlements are along with the national highways, railways and state highways roads.

Class I and II cities have more than 45 percentage of literate population. This range groups has the highest number of village (27) having more than 45 per cent of literate population so that in the Gujarat state large sized villages and urban centres have some relationship with literacy.

Dependency Ratio Analysis:

The dependency ratio is also a very important aspect for the study of demographic aspects. Dependency ratio is affected by the industrial and occupational structure. If the dependency ratio is more than the consumption per capita will be two and hence the standard of living will tend to go down. The dependency ratio also gives an indication of economic developments as well as the proportion of children and aged people to the total population. The dependency ratio is very high in developing countries as compared to the developed countries.

The dependency distribution shows the following table of Gujarat:

Table 3.6 : The distribution of settlements according to the dependency ratio and size class of settlements in Gujarat State 1961.

Sr. No.	Dependency ratio	Class I Towns	Class II Towns	Class III Towns	Class IV Towns	Class V Towns	Class VI Towns	Class VII- age	Total No. Settlements
1.	Less than 125	-	-	1	2	-	-	23	26
2.	125-150	-	-	-	-	3	-	18	21
3.	150-175	-	-	3	7	8	4	17	39
4.	175-200	-	-	4	5	14	-	25	45
5.	200-225	2	1	5	14	13	2	18	55
6.	225-250	-	3	11	14	10	1	15	54
7.	250-275	2	3	11	10	6	1	9	42
8.	275 & above	2	2	8	2	9	-	8	31
9.	Total	6	9	43	54	60	8	133	313

The table shows that the class I and II cities have dependency ratios 200 to 275 and above per 100 worker. The majority of the other size classes of urban settlements also have the dependency ratio in the 200+ range. In case of large sized villages the major concentration of settlements are in the range upto 225 persons per 100 workers. The distribution of settlements (village) according to the dependency ratio table shows that villages have low dependency ratio compared to the urban settlements. However this is not quite true because in rural areas we found considerable surplus labour which exists in a disguised form.

Urban settlements have more job facilities higher absorption powers hence the urban dependency ratio should be lower than the rural one. But this is not so in Gujarat state. This can be explained by the fact that the 1961 census was conducted in the month of March and crops are harvested during this month in Gujarat. At this time more workers are needed in agriculture. Hence, seasonal unemployment fails to be taken into consideration and time affects the calculations of the dependency ratio for rural settlements in Gujarat State. The second factor is the definition of workers: this is also not adequate because the census considered only 15 days time of work in previous period. If it is their then they considered as a persons workers.

Villages occur in almost all the ranges of dependency ratios and it appears possible that there exists some relationship between urban and rural settlements, by way of the dependency ratio.

#### Analysis of Variance:

The growth rate of a region apart from its natural growth rate is attributed either to size class, crops or due to the impact of both factors.

The test of validity of the above hypothesis by using the analysis of variance in a two-way manner with the size class of settlements and crop region.

- (i) Crop (region) and size class has impact on growth rate.
- (ii) The crop (region) has impact on growth rate.
- (iii) The size class has impact on growth rate.

To test the three hypotheses by the two way analysis carried out with the following additive model:

$$J_{ijk} = A + B_i + C_j + D_{ij} + E_{ijk}$$

Where

$J_{ijk}$  = Growth rate of particular settlement

A = Component of our all system.

$B_i$  = Influence of crop reason (wheat or 1 = B1, B2, and B3).

$C_j$  = Component of size town or settlement.

$D_{ij}$  = Influence of crop region as well as size class (combined influence).

$E_{ijk}$  = Random component or component due to peculiarity of settlement or town influence.

The crop region of Gujarat is classified as follows:

For the purpose of the study (crop means only major food crop is considered at district level.).

- (i) Rice (Panch Mahal, Baroda and Surat districts).
- (ii) Jowar (Kutch, Surendra Nagar, Rajkot, Jamnagar, Ahmedabad and Broach districts.)
- (iii) Bajra: Banas Kantha, Mehsana, Sabar Kantha Anreli Junagadh, Bhavnagar and Kaira districts).

Table No. 3.7: Description of analysis of variance in a two-way lay out with cases in the sub-classes.

Source of Variation	Degrees of Freedom	Sum of Squares	Means of Squares	Calculated value of F	Table Value of F at 95%
Crops	1554.58	2	717.29	-	-
Size of Class of Settlements	6172.02	5	1234.40	-	-
Interaction	11347.30	10	1134.73	-	-
Error	77714.69	295	263.43	4.30	1.96
Total	196788.59	312	-	-	-

The result shows that the size of settlements and crops have a combined effect on the Growth rate of settlements in the Gujarat region.

The combined influence at 95 per cent is (1.96) and our results comes F value is 4.30 so that it is highly significant influence on (size of settlements and crops) growth rate of settlement in Gujarat region.

CHAPTER 4

Section A : "Functional Classification of Settlements".

Section B : "Distribution of Areas according to the Economic Activities".

The functional behaviour of settlements actually reveals wide variations in urban activities that exist from one region to another. No body has yet done anything on functional classification of settlements on the basis of objective statistical methods in the Gujarat region. The settlements play an important role in the economic development and social change in the regions on the basis of their dominant functions. In this study I have tried to classify the settlements on the basis of functional characteristics. On the basis of functional classification of settlements to relate the distribution of these settlements in their different aspects of demographic characteristics like growth rate, sex ratio, literacy rate and dependency ratio.

The employment figures of the 1961 Census for all towns and village (5,000 and above) of Gujarat have been taken here as a basis for the study of the functional characteristics. An attempt is made to classify the settlements on the basis of predominant functional characteristics.

#### Methodology:

Workers of all these settlements are divided into two categories, Agricultural and Non-agricultural, and the percentage of workers in each is worked out. Those settlements having 50 per cent or more of agricultural workers are considered as a agricultural dominant settlements and are treated separately from those having less than 50 per cent of agricultural workers. Agricultural categories I and II are not taken into consideration when studying the functions of non-agricultural categories. First, the industrial categories III to IX are grouped under three groups A B C to take advantage of triangular co-ordinates. The sum of workers in industrial categories III to IX is taken as 100; and the workers in each of the seven categories are grouped as below:

<u>Groups of Settlements</u>	<u>Census Industrial Categories</u>
A Manufacturing	III, IV, V and VI
B Trade and Commerce	VII and VIII
C Service	IX



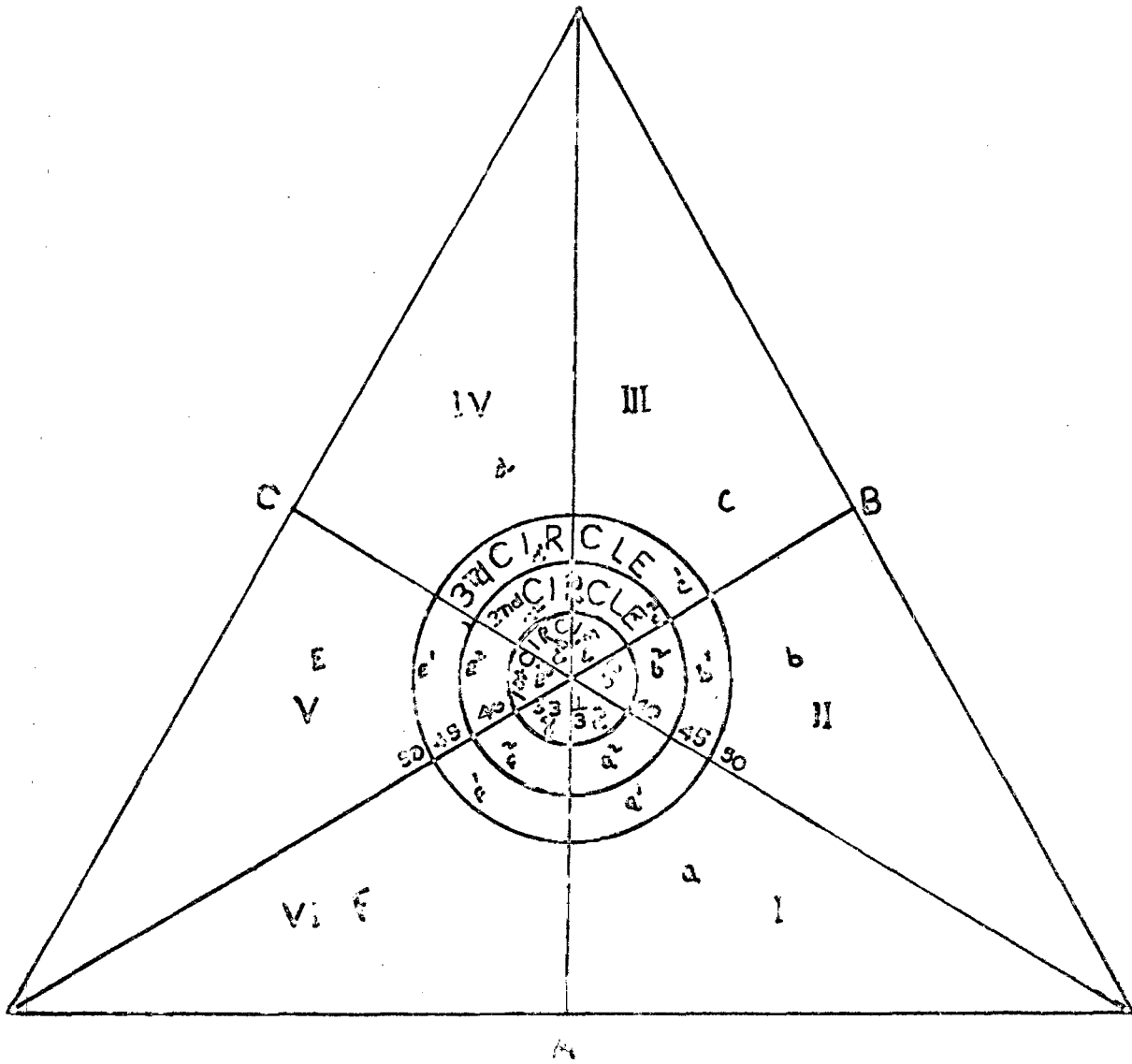


Fig. 17

Each value of the categories A, B and C for each settlements were plotted by triangular coordinates. The position of each settlement in the field of the triangular would facilitate its study with reference to the position of other settlements in the field.

The three functional characteristics A, B and C the standards that have been adopted for the present classification are explained in the chart (Fig. 1.7). The point of intersection of the three perpendiculars represents a value of  $33\frac{1}{3}$  for each of A, B and C. Three circles are now drawn in the triangle with the point of intersection as centre. The first circle has a radius of  $6\frac{2}{3}$ , the second a radius of  $11\frac{2}{3}$ ; and the third a radius of  $16\frac{2}{3}$ . Now any settlement falling inside the first circle (a3, b3, c3, d3, e3 and f3) for all the three sectors will be highly balanced; (ii) in the three sectors A, B and C for any settlements falling in the 2nd circle (a2, b2, c2, d2, e2 and f2) will be moderately balanced and (iii) for the three sectors A B and C any settlements falling in the First Circle (a1, b1, c1, d1, e1 and f1) will be ill-balanced settlements (iv) for the three sectors A B and C for any settlements falling outside the three circles (a, b, c, d, e and f) within the triangular field imbalance will be highly accentuated.

Analysis:

The distribution of settlements according to their functional characteristic, and the nature of settlement as follows:

4.1: The distribution of settlements according to their functions in 1961.

Sr. No.	Nature of Circle functions	Circle	Sector Coordinate	Manufacturing dominant settlements	Trade & Commerce dominant settlement	Service dominant settlements	Total Settlement.
1.	Highly Balanced Settlement	1st	a3, b3, c3, d3 e3 and f3	9	9	15	33
2.	Moderately Balanced Settlements	2nd	a2, b2, c2, d2, e2 and f2	19	6	37	62
3.	Accentuated Settlements	3rd	a1, b1, c1, d1, e1 and f1.	18	4	30	52
4.	Highly Accentuated Settlements	outside of 3rd circles	a, b, c, d, e and f	37	7	20	64
Total				83	26	102	211

The above table shows that the proportion of workers engaged in different settlement activities differ greatly from one group to another. The major function, performed is that of professional services which are rendered in such various fields as education, health, banking insurance, law and administration. It is observed that excepting highly accentuated manufacturing settlements, the service dominant settlements in all three type of functions, highly balanced, moderately balanced, accentuated

are greater as compared to the manufacturing and trade and commerce dominating settlements in all the three-sub-classification of circles.

It is also observed that lowest number of settlements falls in the highly balanced circle. 62 settlements fall in the moderately balanced circle and 52 settlements fall in the accentuated circle. Since there are 37 manufacturing settlements falling in the highly accentuated circle, it shows that these settlements are more industrialised as compared to the rest of the settlements. A larger number of service settlements are found in the moderately balanced circle. This shows that most of the service settlements of Gujarat state have not only service facilities but also trade and commerce and a good number of industries.

Table 4.2: Distribution of Settlements according to the functional characteristics and crop region in Gujarat Region 1961

Crop Region	Manufacturing Dominant Settlements	Trade and Commerce Dominant Settlements	Service Dominant Settlements	Total Settlements
Jawar	33	10	29	72
Bajra	35	9	49	93
Rice	15	7	24	46
Total	83	26	102	211

Table 4.2 shows the distribution of dominant functional characteristic of settlements according to the crop regions. It is observed from the table that the highest number of settlements are lying in the Bajra crop regions, and it is also has the highest number of settlements in all the three dominant functional characteristics. The rice zones have the lowest number of settlements, because in Gujarat, only two districts grow as the major food crop, rice (Surat and Broach).

The Bajra crop region dominant the Jowar region in all categories of functional characteristics except in the trade and commerce functions.

Functional Characteristics  
and Relationships of the Settlements:

The dominant functional characteristics of settlements and demographic variables and relationship are shown in the following tables. Demographic variables have some important role with the settlement like growth rate, sex ratio literacy and dependency ratio.

**Table No. 4.3 : Distribution of Settlements according to the dominant functional characteristics and demographic features:**

Sr. No.	Dominant Functions of Settlements	Average Growth Rate	SD of Growth Rate	Average sex ratio	SD of Sex ratio	Average literacy rate	SD of literacy rate	Average Dependency ratio	SD of Dependency ratio
1.	Manufacturing	34.73	29.06	941	87.86	41.74	8.55	214.28	81.79
2.	Trade and Commerce	26.19	23.92	950	108.21	36.78	12.34	220.29	63.40
3.	Service	31.83	44.46	932	107.17	42.20	8.99	221.13	56.12
4.	Agricultural	21.50	17.53	951	78.89	36.56	11.40	195.97	86.63

Table 4.3 shows that manufacturing settlements have the highest growth rate and the average growth rate is 34.73 per cent next to it is service settlements with a growth rate of 31.83 per cent. Trade and commerce settlements have an average growth rate of 26.19; while agricultural settlements have the lowest growth rate of 21.5 per cent. The table reflects that there is a greater inflow of population to the urban area since manufacturing and service settlements can absorb larger number of people as labour and therefore the growth in the settlements are more compared to the trade and commerce settlements. Agricultural settlements have experienced a very low growth rate because of its rural status.

We observed an opposite trend in case of the sex ratio. The highest sex ratio is found in the Agricultural settlements and the lowest is obtained in the service settlements. The sex ratio of agricultural

settlements indicates the rural nature of these settlements. From the sex ratio and growth rate an interesting relation is obtained that is sex ratio is negatively correlated to the growth rate with the correlation coefficient being (-) 0.8.

Since the service settlements can absorb literate numbers of people therefore the literacy rate is high in these settlements. The literacy rate of these settlements is 42.20 per cent. Next comes the manufacturing settlements with the average literacy rate of 41.74 per cent. The agricultural and trade and commerce settlements have lowest literacy rates namely 36.56 per cent and 36.76 per cent respectively. Service settlements have the highest dependency ratio (221.13) trade and commerce settlements have the next highest dependency ratio is 220.29. These two categories of settlements show high unemployment while the agricultural settlements have the lowest dependency ratio. The table reflects that there is more unemployment in the urban areas than the rural areas i e the unemployment is more in all other categories of settlements than agricultural settlements.

**Table 4.4 : The distribution of settlements according to the functional characteristics and size of settlement in Gujarat.**

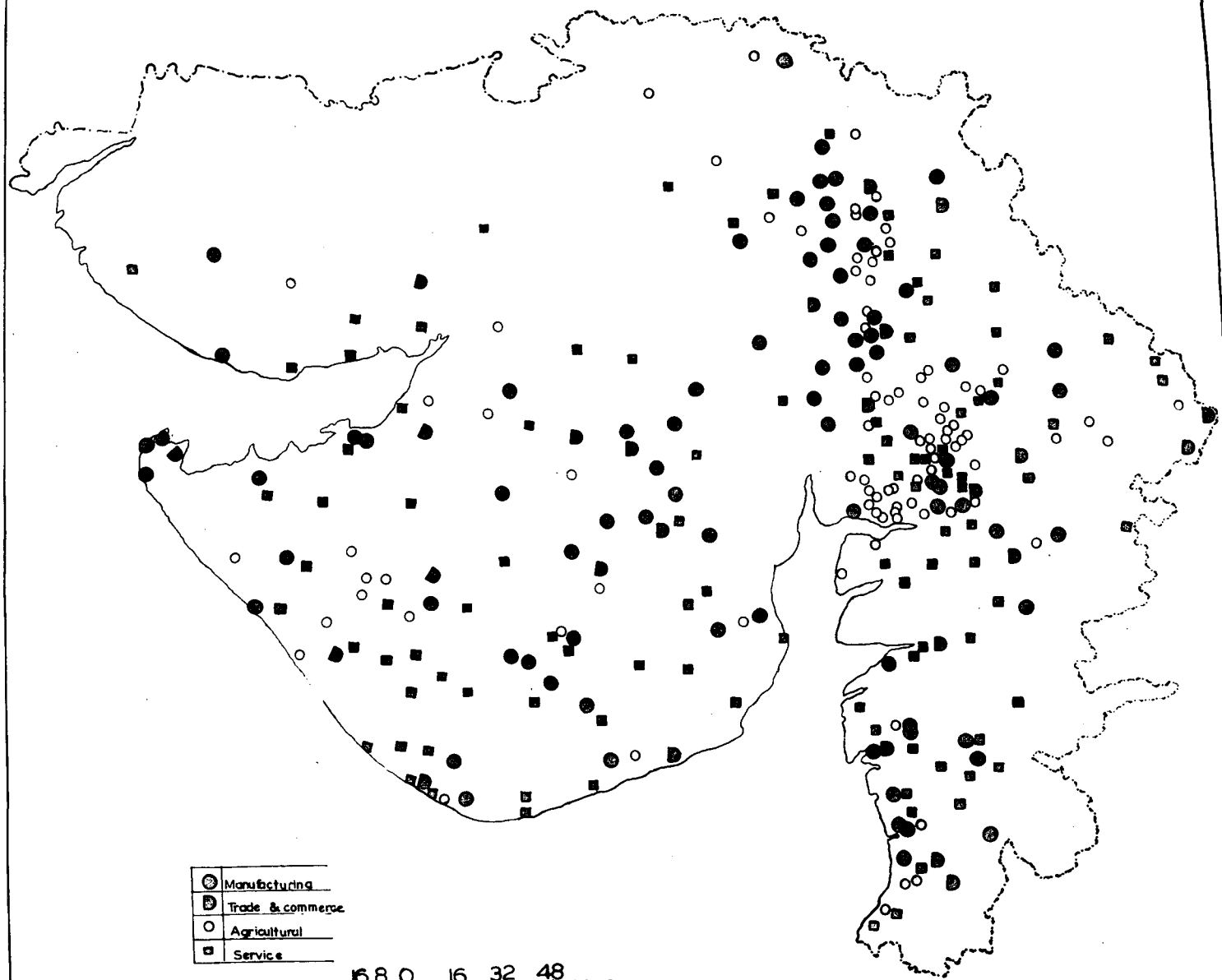
Sr. No. of Settlements	Class of Settlements						Vill-ages	Total
	Class I	Class II	Class III	Class IV	Class V	Class VI		
1. Manufacturing	3	5	17	18	16	1	23	83
2. Trade and Commerce	-	1	6	7	6	2	4	26
3. Service	3	3	18	29	30	2	17	102
4. Total	6	9	41	54	52	5	44	211
5. Total Settlements in the region	6	9	43	54	60	8	133	313

The above table shows that the service settlements dominate in this region. Out of the 211 settlements 102 settlements have the service characteristic.

Professional services occupy a significant position in the urban activities and is rendered by every settlement and city. Because a large variety of services are grouped into this category, the field widens generally with the size of the settlements. Urban functions cannot be denied in the case of some of the very small towns which have nothing to offer other than jobs in the offices. It is really striking to note that, those centres which have rather a dominant functions of



GUJARAT  
FUNCTIONAL DISTRIBUTION OF  
SETTLEMENTS 1961



⊙	Manufacturing
⊠	Trade & commerce
○	Agricultural
□	Service

0 16 32 48 MILES

Fig. 1.8

Fig. 1.8

their own such as industry or any other activity irrespective of their size, keep a low percentage of the working population engaged in other activities.

Manufacturing position is next for the services settlements in Gujarat region. The table reflects that manufacturing activities seem to be the strong point of the large size of settlements relative to the smaller ones, which naturally has a direct impact on limiting the scope of the development of the household industry. As a consequence, activities in that sphere is prevalent on the greater scale in the smaller towns than in the larger ones. It is observed from the Map (Fig. 1.5) that the distributor of manufacturing settlements are mostly along with the national highways and broad gauge lines. Because manufacturing settlements required easy transport and communication facilities that's why the major concentration of manufacturing settlements can be observed to have major roads and railways.

Trade and commerce which offer greater employment opportunities. But in the case of Gujarat very small number of settlements provides this opportunity. The above table reflects that the Trade and commerce settlements are smaller to medium sized settlements.

Trade and commerce, including both retail and wholesale trade, on the other hand is a compulsory activity of the settlements (urban areas). Hence every settlements has a certain proportion of its working population performing this function dealing in goods which range from day to day necessities to those meant for transportation. But the number of workers need not be large in every case and as such the proportion remains comparatively small in the majority of the settlements.

It is also observed that manufacturing activities are concentrated in a greater degree in the towns of large size; being smallest in amount in the smaller ones. In this table one more thing is reflected. That out of 181 urban settlements, 2 settlements in class III, 8 settlements in class V and 3 settlements in class VI categories are have more than 50 per cent of total working force in the agricultural sector.

Table 4.5: Correlation matrix with the manufacturing settlements in Gujarat 1961.

Correlation	Growth Rate	Sex Ratio	Literacy	Dependency Ratio
1. Growth Rate	1.0000	-0.2808	-0.0445	-0.0069
2. Sex Ratio	-	1.0000	0.0622	0.5003
3. Literacy			1.0000	0.2393
4. Dependency Ratio				1.0000

The above table shows the correlation between the growth rate, sex ratio, literacy rate and dependency ratio in the manufacturing dominant settlements. The growth rate and sex ratio are negatively correlated with the correlation coefficient - 0.2808. Sex ratio and dependency ratio are positively correlated in manufacturing dominant settlements.

The above negative correlation is the suggestive of impact of industrialization on the settlements, which in turn attract people from near by settlements and depress the sex-ratio due to that universally true and tested in this study.

Table 4.6 : Correlation matrix of Trade and Commerce Dominant Settlements in Gujarat Region 1961.

Correlation Matrix	Growth Rate	Sex Ratio	Literacy	Dependency Ratio
Growth	1.0000	-0.5478	0.1954	-0.1714
Sex Ratio		1.0000	-0.2865	0.4033
Literacy			1.0000	-0.1965
Dependency Ratio				1.0000

The table shows the correlations among the demographic characteristic in the Trade and Commerce dominant settlements. It is observed that growth rate and sex ratio are negatively correlated with the correlation coefficient -0.5478. It is a strong relationship as compared to the manufacturing settlements. Sex ratio and dependency ratio are positively correlated in the trade and commerce dominant settlements. In case of literacy there is no such relationships along with the growth rate, sex ratio and dependency ratio.

The possibility of the high growth rate settlements having the low sex ratio is selective male migration, which affects the growth rate and sex ratio.

Table No. 4.71 Correlation matrix index with the service dominant settlements in Gujarat 1961.

Correlation index	Growth Rate	Sex Ratio	Literacy	Dependency Ratio
Growth Rate	1.0000	-0.1853	-0.1669	-0.2868
Sex Ratio		1.0000	0.0402	-0.0525
Literacy			1.0000	0.3071
Dependency Ratio				1.0000

The above table shows the correlations among the demographic characteristics in the service dominant settlements. It is observed that there is no such correlation between the demographic characteristics in the service dominant settlements. Only the literacy and dependency are slightly correlated with the correlation coefficient 0.3071.

The service dominant settlements have a higher percentage of literacy due to the greater facilities of education, so that it attracts a higher number of students. The higher student ratio directly effects to the dependency ratio.

Table 4.8: Correlation Matrix index with the Agricultural Settlements in Gujarat Region 1961.

Correlation with	Growth Rate	Sex Ratio	Literacy	Dependency Ratio
Growth Rate	1.0000	-0.0719	-0.0120	0.2680
Sex Ratio		1.0000	0.0815	0.3184
Literacy			1.0000	0.3511
Dependency Ratio				1.0000

The above table shows the correlation among the demographic characteristics with the agricultural settlements. It is observed in this study that there is no significant correlation among the demographic characteristics in the

agricultural settlements. Moreover, the map (Fig. 1.8) shows that the major concentration of Agricultural Settlements are in the Central region of Gujarat. And it is due to the 'fertile' land of Gujarat State.

There is only a slight correlation between the sex ratio and literacy rate and the dependency ratio.

(P  
A  
R  
T - B)

The Distribution of areas According to Economic Activities:

During the 1961 Census the participation of the working force in the different Economic activities of Gujarat is as follows: 68.09 per cent of working force, were engaged in the agricultural activities 1.24 per cent in mining and quarrying. The percentage of manufacturing industries in both (13.95) households and other than households, 6.73 per cent in Trade and commerce; 9.99 per cent in the other services. It shows that manufacturing is the next to agricultural economic activities. The lowest number of persons are engaged in mining and quarrying in the State. The distribution of the male working force in large-sized villages and urban centres in the Gujarat regions are as follows:

**Method:**

We calculated the percentage of male workers of all settlements in the five main categories for the isopleth cartographic methods:

**Categories:**

I & II	Agriculture (Cultivators and Agricultural labourers.
III	Mining and quarrying.
IV and V	Manufacturing (Household and other than household industries)
VII & VIII	Trade and Commerce (Trade, Commerce, Transport and communication).
IX	Other services (other than above services)

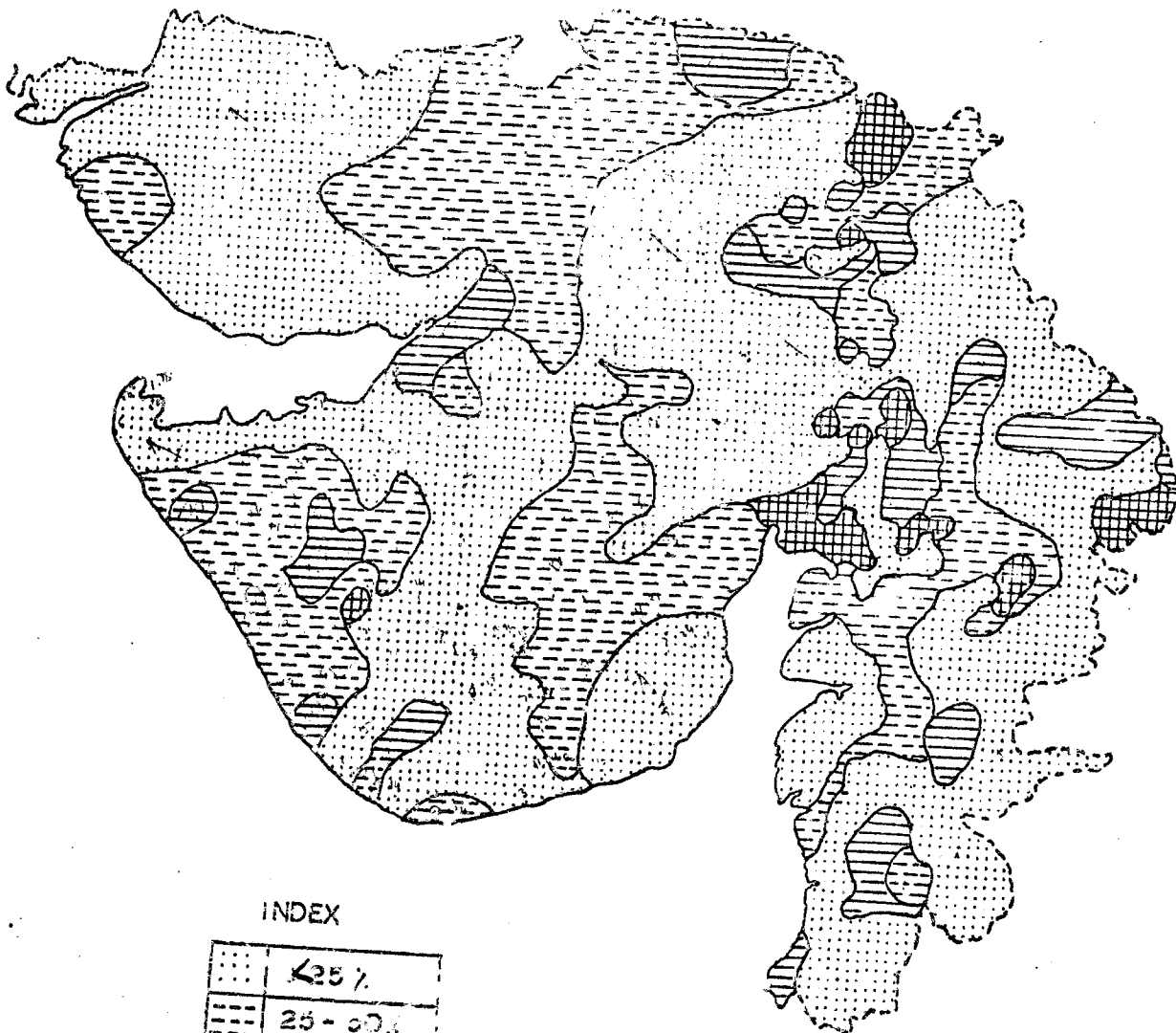
The percentage of each category has been plotted on the map; and the interpolation of isopleths for specific values drawn through interpolated proportionally between them. The isoline indicate the distributions of intelligence percentage.

**(1) Agriculture:**





Agriculture is the basic economic activity of Gujarat, which provides the means of livelihood to the masses of those living in the country-side.



GUJARAT  
PERCENTAGE OF WORKERS ENGAGED  
IN AGRICULTURE  
1951



INDEX

	< 25%
	25 - 50%
	50 - 75%
	> 75%

32 16 0 32  
MILES

Fig. 1.9

GUJARAT  
PERCENTAGE OF WORKERS IN  
MANUFACTURING & HOUSEHOLD  
INDUSTRIES  
1961

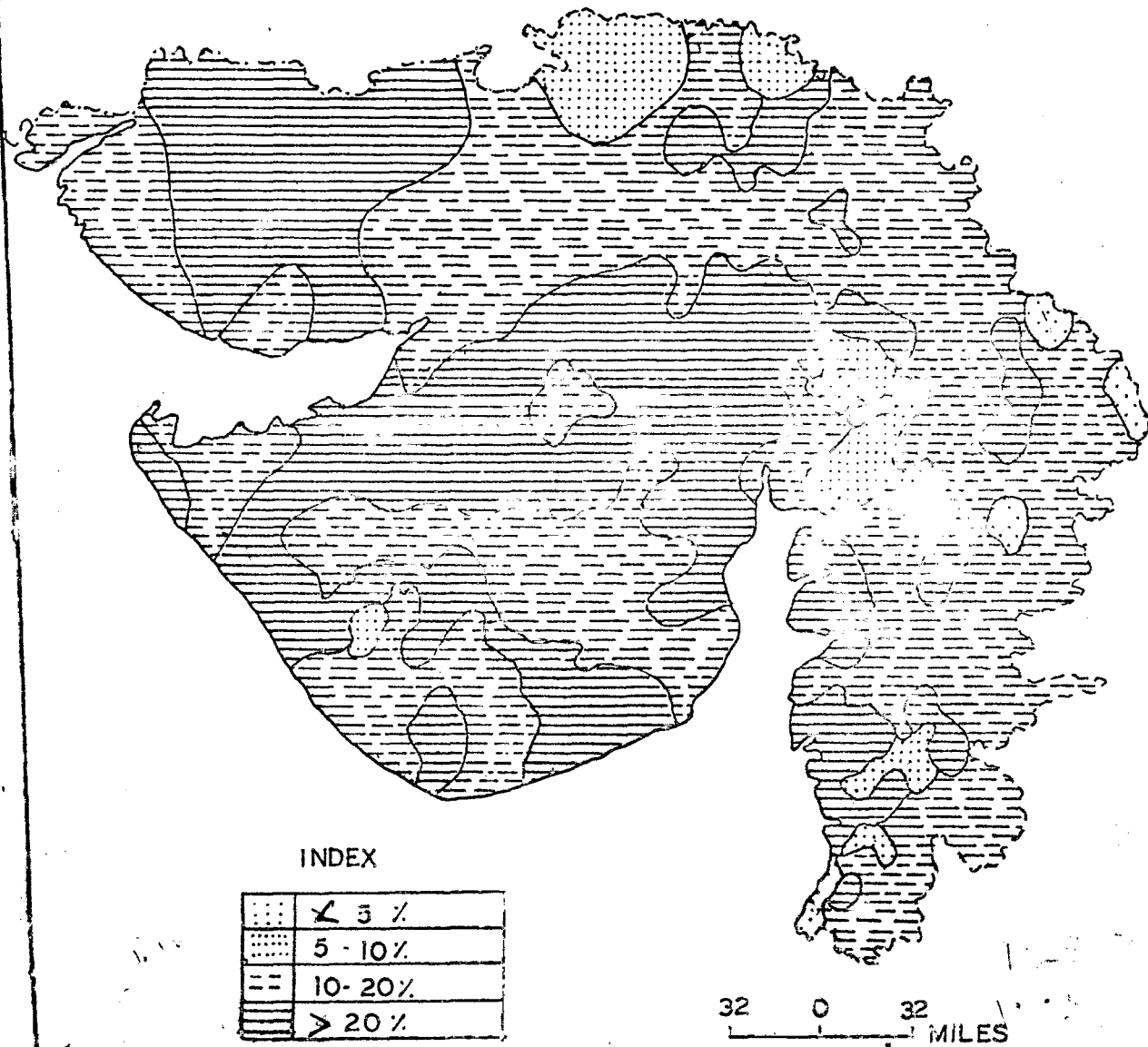


Fig. 1.10

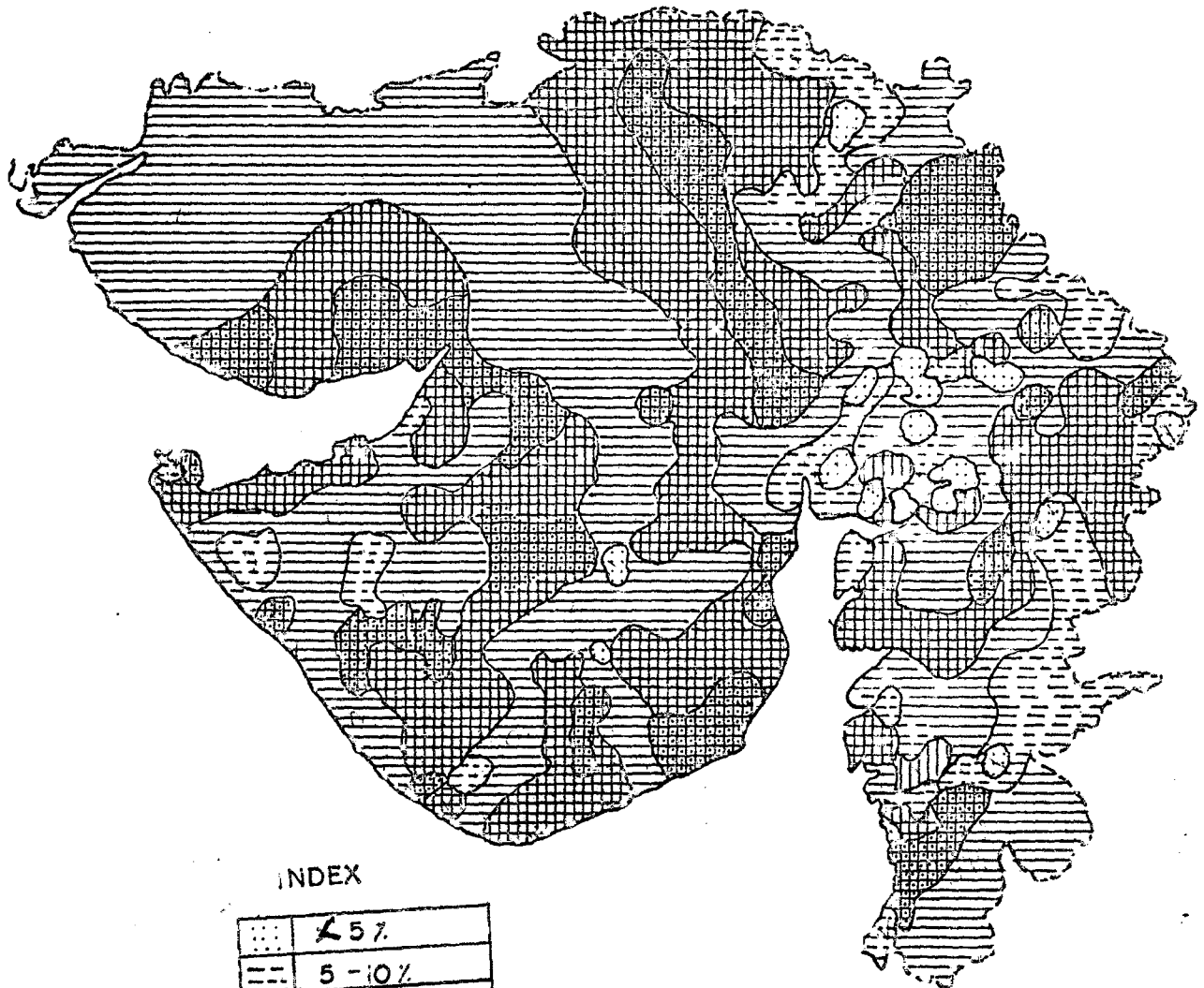
During 1961 the map (Fig. 1.9) shows the participation of male workers by isopleth methods for agricultural picture of the state. In the state the general characteristic is that less than 25 per cent of male workers are in agricultural activities. Less than 50 per cent workers occur most in the Saurashtra region. Few isolated pockets have higher percentages and in this range central Gujarat region is next to Saurashtra region.

The characteristic of less than 75 per cent of agricultural male workers areas occur in the isolated pocket's all over Gujarat. But, the characteristic of more than 75 per cent occur in only very few areas, and these pockets major are concentrated of coastal areas of Cambay in Kaira, Panch Mahals and Banas Kantha districts because these districts have the more fertile land.

### (2) Manufacturing:

The distribution of male working force engaged in manufacturing and other household industries is shown in the map (Fig. 1.10). Less than 5 per cent occur in isolated pockets in the Kaira, Panch Mahals and Surat districts. All the above three districts and Banas- Kantha and Junagadh have less than 10 per cent of male working force areas.

GUJARAT  
PERCENTAGE OF WORKERS ENGAGED IN TRADE;  
COMMERCE, TRANSPORT & COMMUNICATION  
1961



INDEX

	<math>< 5\%</math>
	5 - 10%
	10 - 20%
	20 - 30%
	30 +

32 16 0 32  
MILES

Fig 1.11

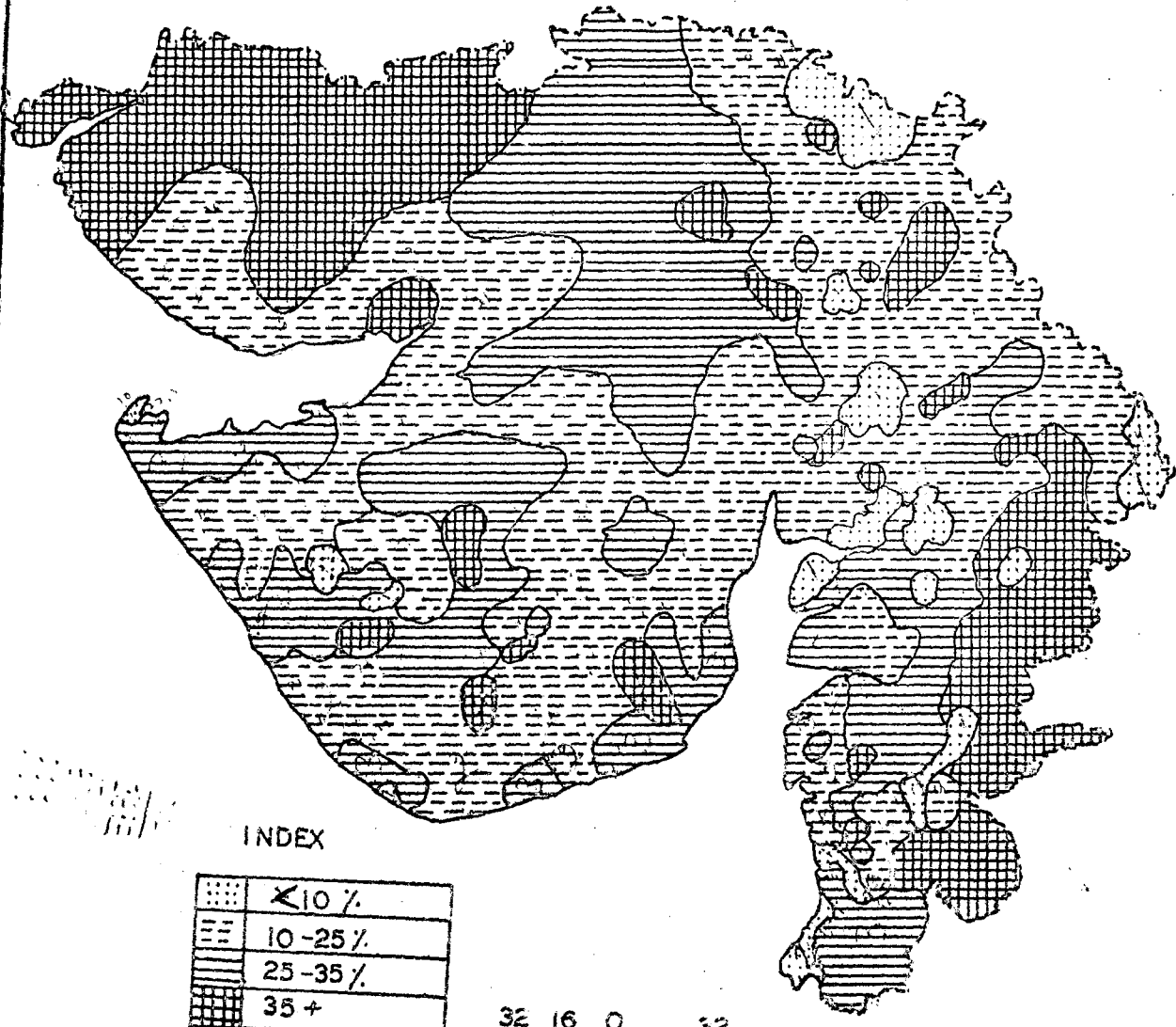
In Gujarat major areas out of the type having less than 20 and above 20 per cent of male workers. The map gives a picture of manufacturing Industries in the State. It clearly shows Gujarat, ranks third in manufacturing industries in India. The major areas of Ahmedabad, Surendranagar, Amreli, Jannagar and Surat districts have more than 20 per cent of working force in the manufacturing industries.

(3) Trade and Commerce:





The distribution of trade and commerce activities shown in the map (Fig. 1.11). It is observed from map that less than 5 per cent of the male working force are engaged in areas mainly in the central Gujarat region. But Saurashtra, Northern and Southern regions have one or two isolated pockets' of such areas. Very few areas of Banas Kantha, Surat and Panch Nehals districts have less than 10 per cent of male working force in Trade and Commerce activities. We can generally say that Gujarat state has its major areas having less than 20 per cent of workers engaged in Trade & Commerce. (Specially the Saurashtra and Southern region). Because of the seaports activity, the coastal areas, have a higher percentage of workers engaged in trade and commerce.

If we super impose the settlements map on the trade and commerce, then the Class I, II and III large size of settlements areas are having the higher percentage of workers.

GUJARAT  
PERCENTAGE OF WORKERS ENGAGED  
IN OTHER SERVICES  
1961



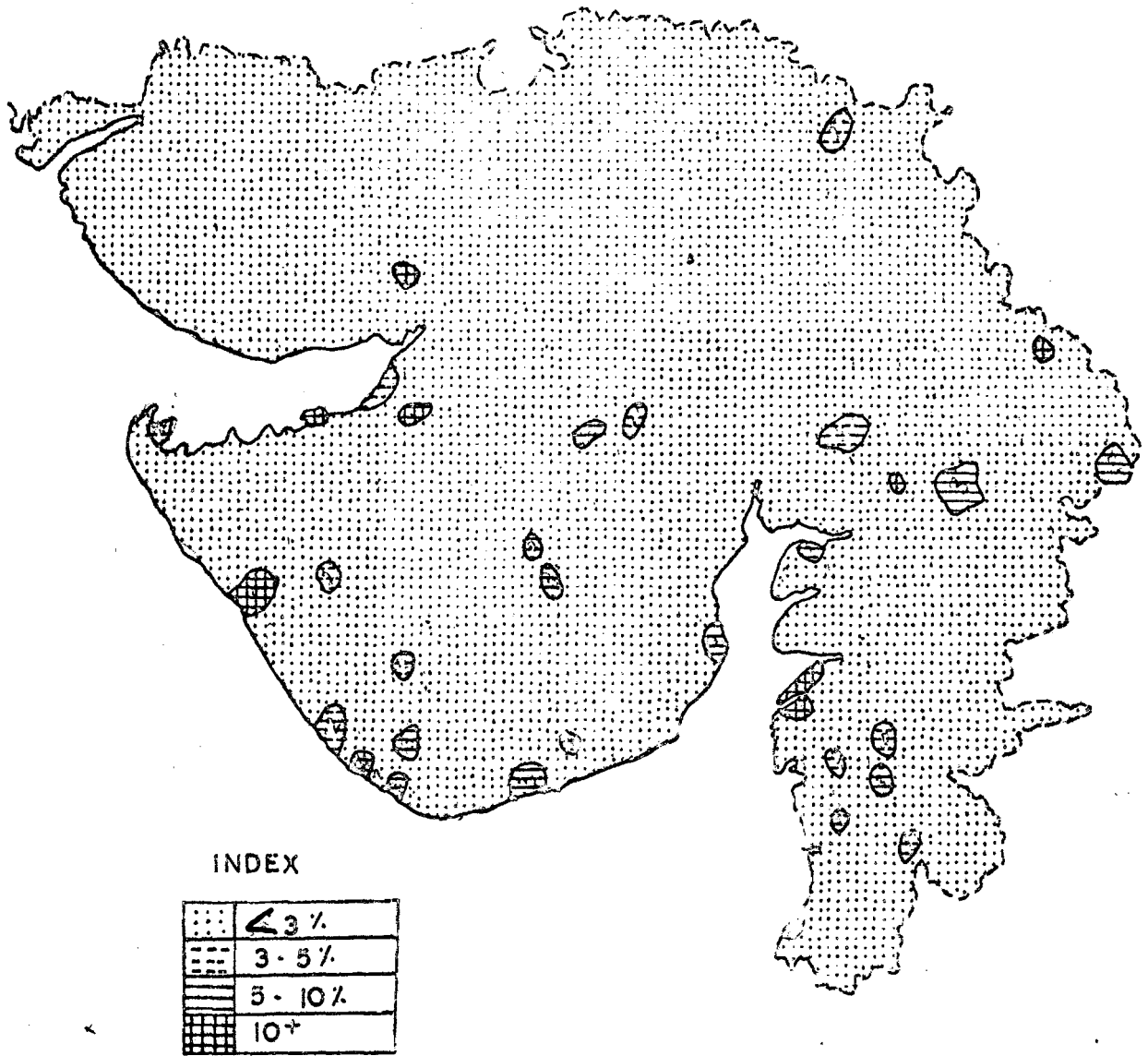
INDEX

	<10%
	10-25%
	25-35%
	35+

32 16 0 32  
MILES

Fig. 1.12

PERCENTAGE OF WORKERS ENGAGED IN  
MINING & QUARRYING 1961  
GUJARAT



32 16 0 32  
MILES

Fig. 1.13

#### (4) Other Services:

It is observed from the map (Fig. 1.12) that the type of having less than 10 per cent of the male working force areas are in isolated pockets except the Kutch, Bhavnagar Surendranagar, Mehsana and Rajkot districts do not have the higher percentage type. As a whole the state's major area have less than 25 per cent of working force in the other services.

The type of more than 35 per cent of workers in the other service areas are mainly along with Madhya Pradesh Border lines. In case of other regions the few isolated pocket areas have the higher percentages of working force in the other services.

#### (5) Mining and Quarrying:

The distribution of the mining and quarry activities shown in the map (Fig. 1.13) indicates that as a whole the state has less than 3 per cent of male working force in this activity. Except for few isolated pockets along the coastal areas and Panch Nehals districts they have more than 10 per cent of working force in mining and quarry activities.



CHAPTER 5SOCIAL AMENITIES IN GUJARAT REGION

The Urban Settlements Planning Scheme and Regional Development Programmes require the development of the infrastructure for making the region viable for economic development. The more the concentration of infrastructural facilities and social amenities in the urban settlements the higher is the social tension. A major blunder the policy makers have committed is that they have given undue weight to cities and urban settlements, at the cost of rural development. This made the urban settlements distinct from the villages, where life is more comfortable and secure.

If the net-work of transport and social amenities are extended to the villages, it would help them to improve their economic and cultural life. Then the migration of the cream of the village youth to swell the army of the unemployed in the urban settlements would decrease. Similarly, social amenities like education, public health, post and telegraph facilities, entertainments etc, are the main instruments which bring into being the rural urban dichotomy of our country. No one would argue

that the development of infra-structural facilities alone determine the level of development of a region. But so far as they help in the whole processes of economic development, the regional inequalities in respect to the availability of infra-structural facilities would have to be tackled expeditiously.

Social amenities are basically 'functions' term which has gained great popularity since Christaller. He brought out his: 'Central place theory' and it has been concerned with the identification of the hierarchy of settlements. These hierarchical structure can be determined through the various types of functions and we here consider the overall amenities found within a region and in individual settlements. The purpose of this chapter is to go into the spatial analysis of the social amenities in the large sized village of Gujarat and for a clear understanding of this, attention is focused on the overall availability of amenities, and certain indication amenities found within the settlements.

We know that all the settlements do not perform all the functions in the same proportion. Similarly not all the settlements perform all the functions at the same level. So this chapter analyses a spatial distribution of various functions and also tries to understand the hierarchy of central functions on the basis of the total functions found within each region.

The social amenities data have been taken mainly from the District Census Hand books.

**Limitations:**

The most important limitation of this study is concerned that in none of the Census of India 1961 publication, were data available for the various amenities found within all the urban and village areas. Therefore no weightages could be worked out for the various urban as well as rural centres, the functions considered the present, although to what degree is still a question that remains unsolved.

Thus, there are hospitals of all sizes ranging from the small to the large. But since we are ignorant of the dimension of such function, and we weight them equally, in accuracy is the result. Whenever a study of this type is taken up with the help of census data, one can surely realize the deficiencies of the data. A few in-accuracies come to light during this study.

The following amenities are considered for this study within the range of their availability. The amenities are as follows:

- (1) **Education:** Educational amenities which include the following
- (a) Primary School
  - (b) Middle School
  - (c) High School
  - (d) Technical institution and Higher Institution including colleges.

**(ii) Health:**

- (a) Medical practitioner
- (b) Dispensaries
- (c) Hospitals
- (d) Meternity and child welfare centres.
- (e) Rural Health centres.

**(iii) Infra-structural: This group includes:**

- (a) Post Offices
- (b) Telegraph Offices
- (c) Telephones
- (d) Electricity in Industrial use
- (e) Electricity in Agricultural use
- (f) Electricity in domestic use
- (g) Water Supply
- (h) Rivers
- (i) Tanks
- (j) Wells

The lower level of functional heirarchy thus is influenced by the next higher level. The method of giving arbitrary weights to the different functions seems enormous as it has no coordination with the relative distribution of these functions on the space over time. This type of giving weightage needs personal judgement and often leads to biased results. To avoid the bias and to have coordination with distribution of these functions over the given space we adopt the following methodology to arrive at the centrality score.

**Methodology:**

In this study we use the methodology adopted by Dr. L S Hatt (which has used in a study of Karnal district) to calculate the centrality score. It is proposed that the level

of functional hierarchy should be given numerical values on the basis of their relative importance and multiplied with the weightages, obtained for each of the amenities by using the following formula.

$$W = \frac{\Sigma F_i}{\Sigma S}$$

In this case  $\Sigma S$  is the total number of settlements in the region  $\Sigma F_i$  is the total number of particular social amenities or functions present within a region. The weightage shows the centrality of the function. If a function is equally distributed in the region it has a lower weightage. Any function which is evenly distributed has a higher weightage and is therefore a function of a higher order. The higher is the weightage in the hierarchy the more central function it is.

The weightage calculated for each of the amenities are as follows:

Table 5.1: The weightage calculated for each of the amenities are as follows:

Sr. No.	Amenities or Functions	Weightage
1.	Primary School	0.27
2.	High School	0.52
3.	Middle School	0.29
4.	Technical Institution	7.45
5.	Higher Institutions including Colleges	3.00
6.	Medical Practitioner	0.05
7.	Dispensaries	0.11

Table 5.1..contd...

Table 5.1 continued.

Sr.No.	Amenities or Functions	Weightage
8.	Hospital	0.95
9.	Meternity and Child Welfare Centre	0.89
10.	Well	0.06
11.	Rural health Centre	1.88
12.	River	1.71
13.	Tank	0.63
14.	For safe of protected water supply including pipes tubes	1.85
15.	Post Office	1.03
16.	Telegraph Office	1.35
17.	Telephone	1.57
18.	Electricity Industrial Use	1.48
19.	Electricity Agricultural Use	1.63
20.	Electricity domestic use	1.44

A composite index for social amenities is calculated by utilizing the weightage figures given in Table 5.1. To get at the composite index for each settlement, the multiple of each social amenity/function and their respective weightages are summed for all functions.

Thus the composite index is as follows:

$$CI = (F_1 W_1) + (F_2 W_2) + (F_3 W_3) + \dots + (F_n W_n)$$

Here CI = composite index

F = function or (amenity)

W = (which is calculated and shown in table weightage - No.5.1).

In Gujarat table No. 5.1 shows the number of amenities and weightage which are taken into consideration in this study. The amenities have been grouped under the three main headings which are discussed within the limitations of the present study.

2. Cartographic techniques have been applied to show the functional hierarchy of settlement.

#### Analysis:

The following is the spatial analysis of social amenities in large sized village and urban centres in the Gujarat region. The Table No.5.2 shows the centrality score which is a composite index of each settlements.

**Table 5.2 : Size of Settlements and Centrality Score (composite Index) in Gujarat Region in 1961.**

Sr. No.	Centrality Score	No. of Settlements	Size of Settlements						
			I	II	III	IV	V	VI Villages	
1.	Less than 10	59	-	-	-	6	7	1	45
2.	10-15	78	-	-	4	6	23	3	42
3.	15-20	55	-	-	4	6	15	1	29
4.	20-30	56	-	-	4	27	8	3	14
5.	30-40	32	-	-	17	8	4	-	3
6.	40 & above	33	6	9	14	1	3	-	-

# SOCIAL AMENITIES HIERARCHY AMONG THE SETTLEMENTS IN GUJARAT 1961

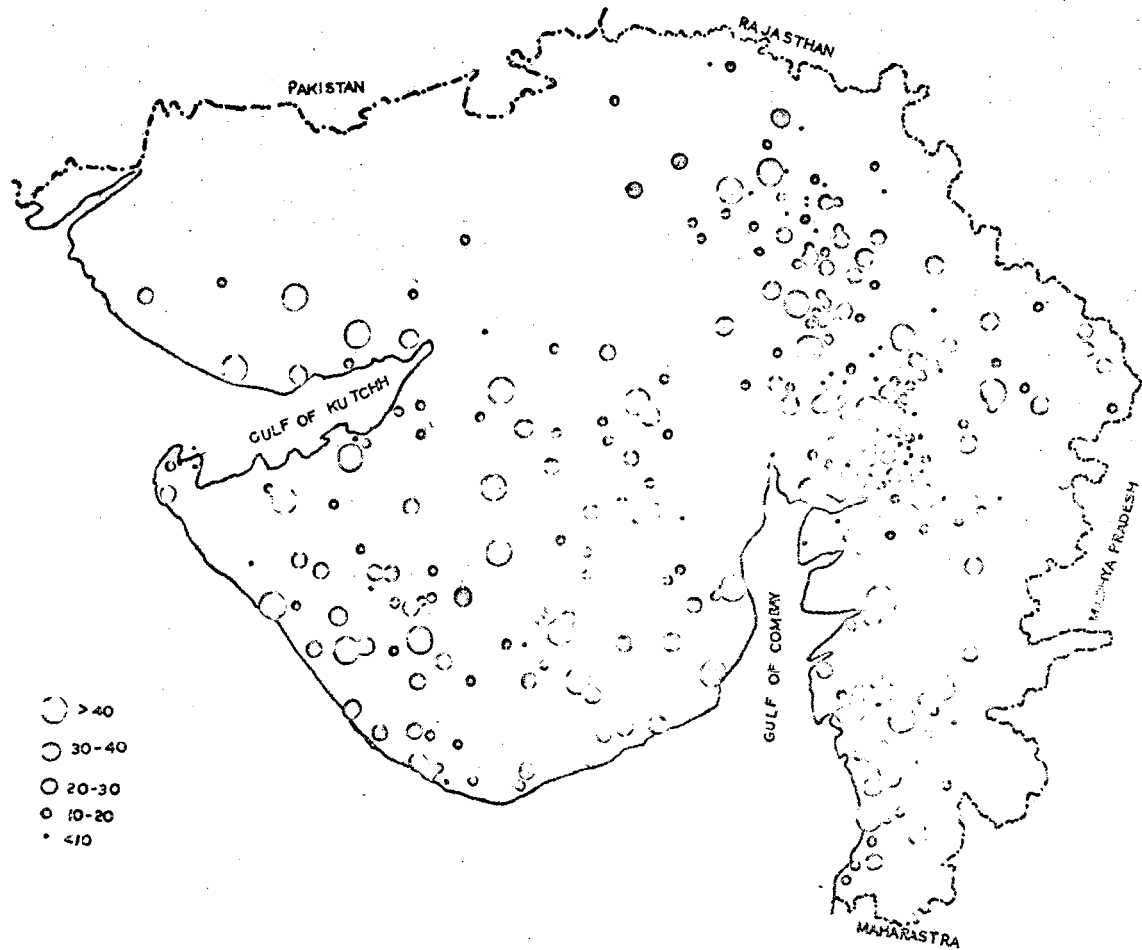


Fig. 1.14



On the basis of centrality score we arranged the settlements into six different hierarchy levels. It is observed from Table No. 5.2 that the highest centrality score has 33 settlements out of 313. This range covers the all class I and II urban centres and there is no class VI and large sized villages. Thirty two in this range settlements have between 30-40 centrality score and are kept in the II hierarchy level. Fifty six settlements fall in the third hierarchy level which has the centrality score 20-30. Fourth level hierarchy of fifty five settlements are there having range between the 15-20 centrality score. The fifth level of hierarchy have 78 settlements and centrality score range between 10-15. This range has the highest number of settlements, and the bulk of the class V and VI settlements fall in this hierarchical level.

The sixth and the lowest level hierarchy function have 59 settlements which has a centrality score of below ten. The large sized city, class I, class I and Class III have the highest centrality score and smaller sized urban and village settlements have the (lower order) low centrality score.

The distribution of the settlements of various hierarchy levels are shown in the map (Fig. 1.14) by the use of proportionate circles. It is observed from the map that

the higher order functional settlements are mainly along with the National highways and broad gauge railways lines. And the lower order functional settlements are mainly concentrate in the Central Gujarat region.

**Table 5.3 : Functional hierarchy in the Gujarat region and its ratio.**

Groups of Functions	Centrality Score in Region	Ratio of Functions		
		I to II	II to III	I & III
I Infra-structural	3387.91	2.8		
II Educational	1553.33			2.7
III Medical	1223.46		1.2	

If we grouped the social amenities according to the infra-structural, educational and medical facilities then the total centrality score of the region is observed from Table No.5.3. The infra-structural amenities have the higher order as well as the highest centrality score of 3387.91. The educational amenities is the second order functions of the region and medical facilities have the lowest order in the region.

The ratio of centrality score between the infra-structural amenities and educational amenities is 2.8. The educational and medical amenities have the ratio of 1.2 and infra-structural and medical amenities have the ratio of 2.7. This ratio shows the general picture of distribution of availability of social amenities as compared to other amenity groups.

The distribution of amenities is shown in Table 5.4 and it shows the amenities as well as the number of settlements not having social amenities.

**Table 5.4 : The Distribution of Amenities in the Gujarat Region in 1961.**

Sr. No.	Name of Amenities	Settlement not having the amenities	%age to the total settlements
1.	Primary Schools	105	33.84
2.	High Schools	61	19.48
3.	Middle Schools	18	5.75
4.	Technical Institutions	209	92.33
5.	Higher Institutions including Colleges	275	87.85
6.	Medical Practitioners	19	6.07
7.	Dispensaries	50	15.97
8.	Hospitals	140	44.72
9.	Meternity and Child Welfare Centres	188	60.06
10.	Wells	21	6.70
11.	Rural health Centres	183	58.46
12.	For safe or proceeded Water supply including pipes tubles	142	45.36
13.	Post Offices	8	2.55
14.	Telegraph Offices	80	25.55
15.	Telephones	114	36.42
16.	Electricity in Industrial Use	104	33.22
17.	Electricity in Agricultural Use	115	36.74
18.	Electricity in Domestic Use	97	30.99

(1) Educational Amenities: (Groups)

Primary education is free in all the states and compulsory in most of them. Yet the number of school going children have not increased substantially, so that it is necessary to know the distribution of educational amenities in the large size villages. Educational facilities determines literacy with the prevalence of a sound economic condition in the village as well as urban centres. But so far as the educational amenities are concerned, it is observed that 33.54 per cent settlements do not have even primary schools, 19.48 per cent high schools, 92.33 per cent technical institutions, 5.75 per cent middle schools and 87.85 per cent higher institutions including the colleges. So it is clear that compulsory primary education is not possible without providing the necessary educational facilities. It is also observed that the large sized villages are not having sufficient educational facilities in the region. The higher institutions and technical are restricted to a very small number of settlements.

(ii) Distribution of Medical Amenities:

Over the decades of planned development we were not able to achieve the basic objectives of providing adequate medical facilities. The health status of a village as well as urban centre can be reflected by the medical facilities available in it. The distribution of the medical facilities also gives a picture of the general health of the population.

It is observed from Table No.5.4 that 15.97 per cent of settlements are not having a dispensary, 44.72 per cent do not have hospitals, 60.06 per cent maternity and child welfare centres and 58.46 per cent Rural Health Centres. Only 6.07 per cent of the settlements are having private medical practitioners in Gujarat. It can be said generally that medical facilities are very poorly developed in the region.

The concentration of medical facilities is greater in the urban areas than in the rural areas, where the people have to walk miles for such facilities. More than the governmental facilities we have private doctors in service of the people. The medical facilities are still very nominal in proportion to the population they serve. It is a serious problem that young doctors hesitate to work in the villages, due to the fact that the medical profession is much better paid in cities than in villages. Secondly because professional doctors are trained in medical colleges located in the better cities which encourages medical professionals to stay in the cities.

#### Infra-structural Amenities:

The infra-structural amenities that have been considered here are post offices telegraph offices, telephones electricity in industrial use, agricultural and domestic use,

water supply (safe and protected). The role of infra-structural is very important within the region as well as out side the region.

Infra-structural amenities are directly related to the economic and social development of a region.

From the picture of infra-structural amenities available within the settlements and in the study region, it is observed from Table No.5.4 that 2.55 per cent of settlements do not have post offices, 25.55 per cent of settlements telegraph offices, 36.42 per cent of settlements telephone, 33.22 per cent is electricity in industrial use, 36.74 per cent in agricultural use, 30.99 per cent of settlements for domestic use and 45.36 per cent are not having safe and protected water supply.

It can therefore be seen that there is a severe shortage of all the facilities except post offices in Gujarat.

CHAPTER 6"Shifting of Towns Downward-Upward  
and Urban Status".

The main aim of the study is to delineate the shifting of the status and the concentration of towns on the basis of the newly defined towns during the period of 1961 and 1971 Census. It gives some idea on urbanization.

It is our purpose to find out from the Census figures of 1961 and 1971 how many new towns were added and in which classes and how many of them were declassified, at the regional level? How has such classification affected the growth rate of urbanization<sup>2</sup>?

The Study is based on 1951, 1961 and 1971 Census data and on these two decades - 1951-1961 and 1961-71. We wish to find out what changes occurred in the status of towns due to their upward and downward shifting. It also considers towns, which have undergone declassification, or which have lost their urban status and the towns which have been given urban status during the period.

The population of Gujarat increased by million during 1951-61 from 16 million in 1951 to 20 million in 1961. The decennial growth rate, being 26.88 per cent was higher than the all India growth rate of 21.5 per cent. It shows appreciable regional unevenness, and is a interesting problem because the growth of urban population brought about some changes in the status of towns in the region. It can be observed from the Table No. 6.1

Table No. 6.1: Change due to urban Population in the Status of towns in Gujarat Region:

Sr. No.	Class of Towns	1961	Percentage of total urban population	1971	Percentage of total urban population
1.	I	6	43.48	7	45.10
2.	II	9	11.70	18	15.66
3.	III	43	22.49	42	17.72
4.	IV	54	13.48	73	14.04
5.	V	60	8.66	71	7.04
6.	VI	8	0.69	5	0.28
		180	100.00	216	100.00

Source:- Part V A, Towns directory of Gujarat 1971.

It is obvious from the above table that the total urban population of cities of class I have increased from 43.48 per cent to 45.10 per cent in 1971. It also shows the percentage of population residing in towns belonging to class II



GUJARAT  
STATUS OF TOWNS IN 1961



INDEX

●	CLASS I CITIES
⊖	--- II TOWNS
⊕	--- III TOWNS
⊗	--- IV TOWNS
⊘	--- V TOWNS
⊙	--- VI TOWNS
⊚	TOWNS ADDED 1961
⊛	TOWNS ADDED 1961

16 8 0 16 32 48 MILES

has also risen from 11.70 per cent to 15.66 per cent in 1971; Class III towns as<sup>STM</sup> they have gone down from 22.49 per cent to 17.72 per cent and Class V and VI towns have slightly gone down from 9.35 per cent in 1961 to 7.32 per cent in 1971. It shows that the smaller towns have moved on to higher classes. This is the reason that it has some meaning for shifting of towns as well as the emerging of settlements in the region.

New Towns added during 1951-61 and 1961-71

Distribution of the new towns added during the two decades is shown in table No. 6.2 and urban status map (Fig.1.15) shows - on the basis of regional level.

Table No. 6.2: New Towns added in Regional base in 1961-71

Sr. No.	Class of Towns	Total Towns 61-71		Southern		Central		Northern		Saurashtra		Western		Eastern	
		1961	1971	1961	1971	1961	71	1961	71	1961	71	1961	71	1961	71
1.	I	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	II	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	III	0	4	-	1	-	3	-	-	-	-	-	-	-	-
4.	IV	5	5	3	2	-	2	-	-	1	-	-	-	1	1
5.	V	10	37	2	7	4	9	-	6	2	10	1	5	1	-
6.	VI	2	3	-	2	-	1	-	-	2	-	-	-	-	-
<b>Total</b>		<b>17</b>	<b>49</b>	<b>5</b>	<b>12</b>	<b>4</b>	<b>15</b>	<b>-</b>	<b>6</b>	<b>5</b>	<b>10</b>	<b>1</b>	<b>5</b>	<b>2</b>	<b>1</b>

It is observed from the table that during the 1951-61 Census, 17 new settlements have been given urban status. All settlements have attained the urban status for the first time. The

distribution of new towns in region is as follows: Sikka, Bedi, Tankara, Dengar and Tala in the Sourashtra region, Kardla in Western region. Ahmedabad cantonment and civil, Vallab Vidya Nagar, Pali, Gorwa in the Central Gujarat region, Katargam, Jalalpur, Abrama, Pardi, Vapi in the Southern Gujarat regional and Shivraipur and Freeland Ganj in Eastern Gujarat region.

Of the 17 new towns, 2 are in class VI category, 10 towns are in class V and 5 towns are in class IV category. During 1971, 49 new settlements have been given urban status. It is not that all these towns have attained urban status for the first time in 1971. Some of these towns were treated with urban status in earlier Censuses but were subsequently declassified either during 1961 Census or in earlier Censuses. "Only 29 out of 49 attained urban status for the first time in 1971 Census".

The distribution of new towns added in 1971 is as follows: 12 towns added in the Southern Gujarat region and out of them status is one class III town, 2 class IV, 7 class V, and 2 class VI towns. In the central Gujarat region total 15 towns were added and their status 3 towns in class III, 2 towns were added and their status 3 towns in class III, 2 towns in class IV, 9 in class V and one in the class VI - categories, 6 towns in class V category added in the Northern Gujarat region. Ten towns in Class V category were added in the saurashtra region.

5 towns class V in the Western Gujarat-region and one town in class IV in the Eastern region.

Gandhi Nagar which is the new Capital in Gujarat State has come up during the decade 1961-71. Similarly Fertilizer Nagar and Jawaharnagar are appearing as urban status for the first time during the 1971 Census. The former being an industrial-cum-residential town, has sprung up due to manufacturing of fertilizer's and the latter because<sup>of</sup> an oil refinery. Udhvana is an industrial township near Surat, Ukai with a population of 31,234 persons is the Ukai irrigation project township which has also come up during the last decade.<sup>1</sup>

During the 1971 Census three settlements were treated for the first time as towns those having less than 5000 population each Hansol in Ahmedabad, Atual and Udhvana both in Valsad district. All the three towns come up due to industrialization and manufacturing industries.

It clearly shows that during the 1951-61 decade total number of new towns added in Gujarat state were only 53 per cent in Class V and during 1961-71 near about 75.3 per cent settlements added in class V. So that most new emerging towns came up in class V status except few cases due to certain above described other

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1. Part IX A Census of India, Gujarat State, General Administrative Report, 1971 and Part V A Town directing of Gujarat 1971.

GUJARAT

DECLASSIFIED TOWNS IN 1961 AND 1971

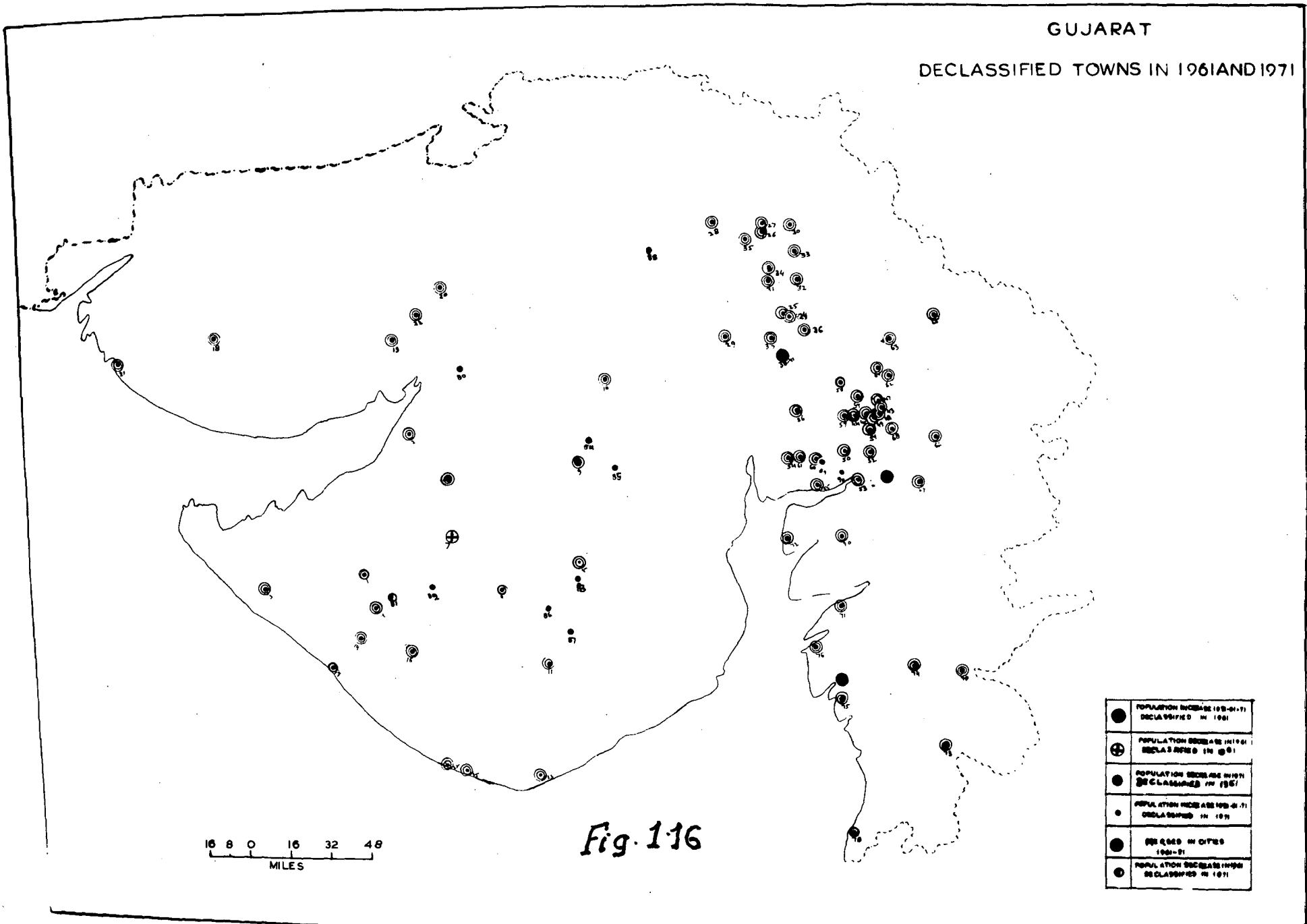


Fig. 116

0 8 16 32 48  
MILES

●	POPULATION INCREASE 1951-61 DECLASSIFIED IN 1961
⊕	POPULATION DECREASE 1951-61 DECLASSIFIED IN 1961
●	POPULATION INCREASE 1961-71 DECLASSIFIED IN 1971
●	POPULATION DECREASE 1961-71 DECLASSIFIED IN 1971
●	DECLASSIFIED IN CITIES 1961-71
●	POPULATION DECREASE 1961-71 DECLASSIFIED IN 1971

factors increased the status of towns in the Gujarat State.

Analysis of Declassified towns  
during the 1951-61 and 1961-71

Once a settlement is declared as urban status, it is possible that due to certain causes it is declassified and again treated as rural, shown in map (Fig. 1.16). The distribution of declassified settlements is as follows:

Table 6.3 : Distribution of Settlements declassified in the region  
level of Gujarat State.

Sr. No.	Division of Region	Declassified in 1971	Declassified in 1961
1.	Southern Gujarat	1	6
2.	Central Gujarat	5	47
3.	Northern Gujarat	-	1
4.	Saurashtra	8	17
5.	Eastern Gujarat	-	2
6.	Western Gujarat	-	5
	<b>Total</b>	<b>14</b>	<b>78</b>

During 1951 a total of 233 settlements were declared as urban in Gujarat. This figure declined to 181 during the 1961. It does not mean that 233 towns of the 1961 Census have retained their urban status and there were no new towns added during 1961. Out of these 233 towns of 1951 Census 78 settlements did not

appear as towns in 1961 again. Out of these 78 urban settlements five namely (i) Achar (ii) Vadaaj, (iii) Amraiwadi, (iv) Rakhial (v) Khekhara Mehmedabad, were merged with Ahmadabad city. In reality only 73 towns were declassified during 1961. Table 6.3 shows the distribution of the towns declassified during 1961 and 1971 in regional level of Gujarat State.

The highest number of towns declassified during the Census 1961 were in the Central region. It has the fertile and multicropped areas and out of them most towns are non-industrial areas. This region has good transport facilities and the map (Fig 1.2) shows that they are mostly along the National high-way and broad gauge railway lines. Saurashtra region is next to the Central region as far as declassification of town goes. The map (Fig. 1.16) shows that in this region declassified towns are evenly distributed. The population of these towns are increasing except for two settlements during 1951-61 and 71. This area is single cropped arid zone of the state. The saurashtra regions' declassified towns are not near class I and II. categories. This region does not have good facilities of roads and railways - (along with the other roads). In the case of the Southern region all towns declassified are in the Surat district, and except for one town in which population decreased in 1971 all have increasing population during 1951, 61 and 71. If super impose on the transport Map (Fig.1.2) then all the settlements have other state

road facilities in this region. These towns have the fertile black deep soil and are multicropped. Dangs district is completely rural area there is no urban settlement because - this district has 94 per cent of Tribal population and large forest areas. The Western region's declassified towns are in the kutch district and all settlements are having the state roads. All the towns population during 1951, 61 and 71 were increasing. These towns are in the semi-arid as well as single cropped areas. The minimum number of settlements were declassified in the Eastern and Northern regions one in Eastern and two in the Northern Region.

During 1961 Census, 181 settlements were declared as urban in Gujarat. This figure increased to 216 during 1971. It does not mean that all the 181 towns of 1961 have retained their urban status during 1971 Census. Out of these 181 towns of 1961 14 settlements do not appear as towns in 1971 again (See table No. 6.3) out of these 14 settlements three were merged with cities namely, (i) Gorva with Baroda, (ii) Raner with Surat city and (iii) Ahmadabad Military Cantonment merged in the Ahmadabad cantonment. So that actually 11 settlements of 1961 were declassified in 1971.

During 1971 the highest number of settlements declassified were in the Saurashtra region. These settlements were evenly distributed within the regions with the exception of one settlement all have increasing population during 1951, 61 and 1971. The



GUJARAT  
DOWNWARD-UPWARD SHIFTING OF TOWNS  
IN 1951-61-71

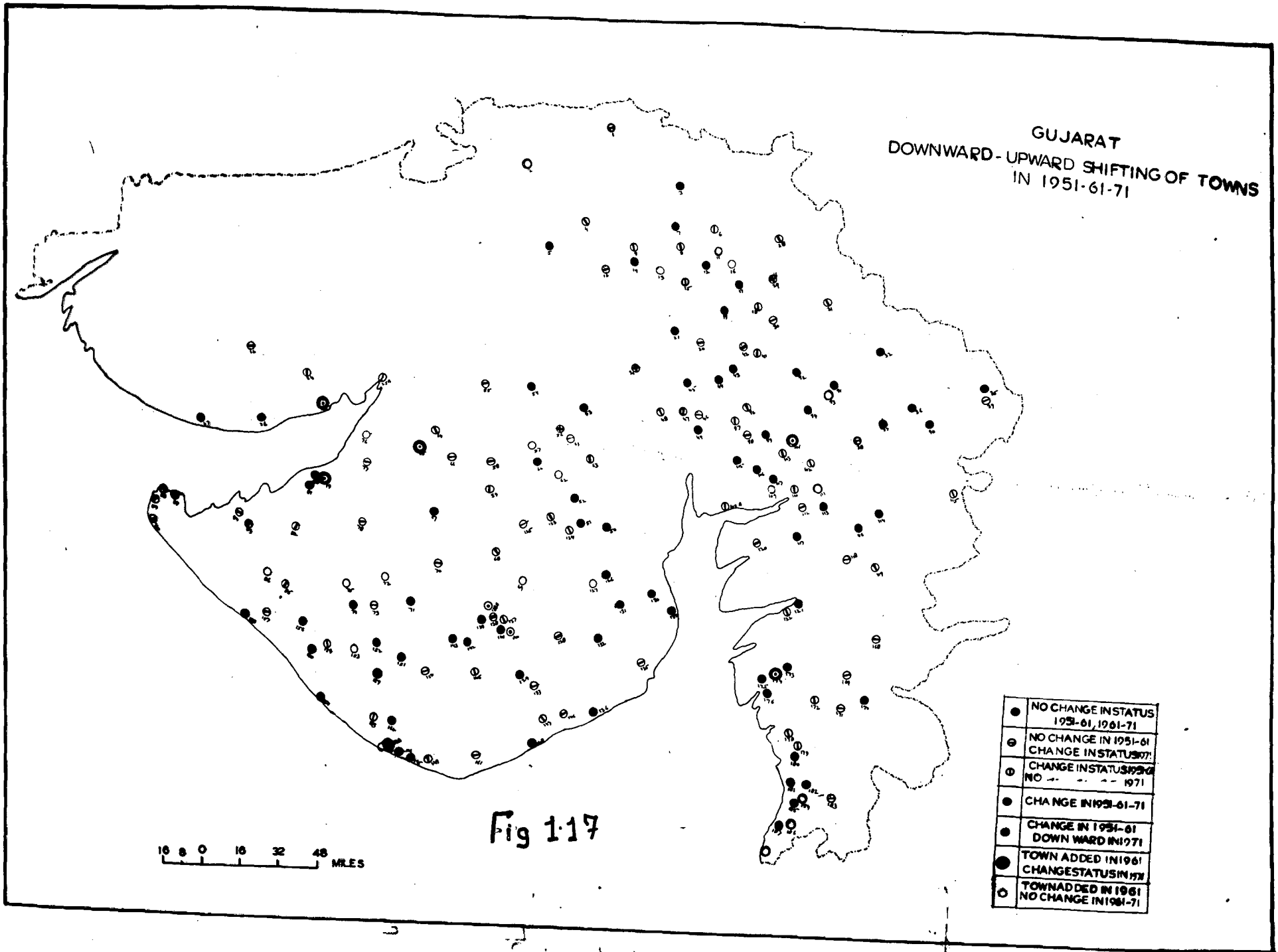


Fig 1:17

0 16 32 48 MILES

●	NO CHANGE IN STATUS 1951-61, 1961-71
⊖	NO CHANGE IN 1951-61 CHANGE IN STATUS IN 1961-71
⊕	CHANGE IN STATUS IN 1951-61 NO CHANGE IN STATUS IN 1961-71
●	CHANGE IN 1951-61-71
●	CHANGE IN 1951-61 DOWNWARD IN 1971
●	TOWN ADDED IN 1961 CHANGE STATUS IN 1971
○	TOWN ADDED IN 1961 NO CHANGE IN 1961-71

Fig 1:17

central region is next to Sourashtra region in 1971 for declassification of settlements and this region is a fertile and multi-cropped area. In Southern region one settlement was declassified in Surat district. If we super-impose with the functional classifications of settlements map (Fig. 1.8) then all these settlements have agricultural status or primary activities only. Except Corva, Rander and Ahmedabad Military cantonment which do not exist as separate towns now because they merged in cities and all these three towns have the industrial-cum-commercial activities.

#### Shifting of Towns during 1951, 61 and 71.

The shifting of towns during two decades of upwards and downward status shows in map (Fig. 1.17) in regional level is as follows:

Table No. 6.4: Distribution of Towns according to the upward and downward shifting during 1961-71.

Sr. No.	Size of Settlements shifting	Total Settlements		South ern regi on		Cent ral regi on		North ern regi on		Soura- shtra Regi on		Western Region		Eastern Region	
		61	71	61	71	61	71	61	71	61	71	61	71	61	71
1.	Class II to I	0	1	-	1	-	-	-	-	-	-	-	-	-	-
2.	Class III to II	5	9	1	-	1	2	-	-	2	5	-	1	1	1
3.	" IV to III	9	9	3	1	3	3	-	2	2	3	1	-	-	-
4.	" V to IV	24	22	2	1	6	4	3	2	13	13	-	1	-	1
5.	" VI to V	11	6	-	-	2	2	2	-	6	4	-	-	1	-
6.	" V to III	1	0	-	-	-	-	-	-	-	-	1	-	-	-
7.	" V to II	0	1	-	1	-	-	-	-	-	-	-	-	-	-
8.	" IV to II	0	2	-	-	-	-	-	-	-	1	-	-	-	1
9.	" III to IV	-	1	-	-	-	-	-	-	-	1	-	-	-	-
10.	Total	50	51	6	4	12	11	5	4	23	27	2	2	2	3

It is observed from the above table that during the two decades the highest number of settlements which changed their status is in the Saurashtra regions, and especially in class V to IV types. This region also has the one town which move upward during the 1971 from class IV to II and one which moved downward from class III to IV is Kham bhalla in Jam Nagar districts' it is having the agricultural dominating activities. During 1961 none of the towns shifted downward. Except for three towns none shifted status from smaller size to large sized settlements.

The central region's status is next to the Saurashtra in shifting of towns. It also has the highest number of settlements in class V which moved to IV. So that we can say that (Class VI, V and IV) smaller size of towns more frequently move upward in the Gujarat state. Although the central region has good transport net work and fertile soil, the settlement's status movement upwards is not marked. This region also having the highest number of settlements declassified during the 1961.

In the case of Western and Eastern regions very few towns moved upwards because they have very poor transport net works, Sandy soil and single cropped area. Irrigation is mainly by wells and also not sufficient water resources exist. It is affected by the emigration. Map (Fig. 1.17) clearly shows that in the Central region and Saurashtra has the largest number of towns which have not changed status.

## CONCLUSIONS

On the basis of settlements study, we can conclude something which comes out at the regional level of Gujarat State. Gujarat has important features, demographic geographical and economic and that these aspects play an important role in the development of regions. From the study of the large sized villages and urban centres, the following conclusions are indicated.

- (i) The highest percentage (29.4) of settlements are lying in the Medium black soil region and also the higher number of settlements in all size class towns and villages.
- (ii) In the whole region the distribution of the settlements have followed a random pattern. But, the Kaira districts have clustered and some, viz., Bhavnagar, Jamnagar, Junagadh and Banaskantha districts have the uniform pattern of settlements.
- (iii)
  - (a) The Lorenz Curve of Population Concentration shows the random distribution in the State.
  - (b) The Lorenz Curve of settlements within the areas, indicate that the concentration is uniformly distributed.

- (iv) The population and settlements concentration are shown by the Gini's Co-efficient and the population is more evenly distributed (G. Value is 0.2572).
- (v) In case of settlements we find that the distribution has concentrated (its co-efficients is 0.4514).
- (vi) The location of settlements are highest (50.47 per cent) along with the other roads. 39.50 per cent with state highway 29.71 per cent with metre gauge railway stations and only 2.87 per cent of settlements lack roads and railwaylines in the Gujarat region.
- (vii) Metalled roads and railways are highly positively correlated and its co-efficient is 0.8901.

The distribution of settlements according to the size groups and demographic characteristics of state. The size of settlements increases as the average dependency rate, literacy and growth rate increases excepts class VI settlements.

In the Gujarat State the average sex ratio is higher in all the size class of settlements relative to the National (Urban) average. During 1961 as a whole the states, as well as The National Sex Ratio is 941. But, in case of our

study except for Class V settlements the state has lower than National and State average sex ratio.

The large sized urban settlements have a high growth rate and literacy with the low sex ratio and dependency ratio. 61 per cent of the settlements has less than 30 per cent growth rate. The major settlements are concentrated in the more than 4000 persons per sq. km density area in all the size class, except the villages which have lower ranges of density. The lowest number of settlements are lying in the range 1500-2000 persons per sq. km. (See Table 3.3).

The highest number 97 settlements are in 900-950 ranges of females per 1000 males and 53 settlements have the more than 1000 females of per 1000 males. The Class I and II cities have less than 1000 females sex ratio.

The main concentration of settlements of literacy rate in the two ranges (45-50 per cent and above 50). The highest literacy percentage is found in 54 settlements and except for few villages the rest of the settlements are along national high ways, railways and state highways roads. 11 settlements are having the less than 20 per cent of literacy and except one all are villages.

The Class I and II cities have higher percentage of literacy and in this range 27 villages are having more than 45 per cent literacy, so that in Gujarat state the large sized villages and urban centres have some relationship with literacy.

The transport net work and literacy have a positive relation in the state. The Class I and II cities have more than 200 persons dependent on 100 workers and for the other size class of settlements (urban) also having the main concentration in the above frequency ranges. The study shows that urban centres have a high dependency ratios and villages are having lower dependency ratios.

The table No. 3.7 shows that the size of settlements and crops have combined effect on the growth rate of settlement. The value ( $f = 4.30$ ) shows the highly significant influence crops and size of settlement on growth rate of in Gujarat region.

The Gujarat state settlements is having the services as the dominant characteristic. Only 33 settlements are having the highly balanced functional activities in the region. Manufacturing and service activities seem to be the strong point of the large sized (Class I, II and III) settlements in the State.

The trade and commerce dominate settlements are mostly smaller and medium sized settlements.

The Growth rate and sex ratio are negatively correlated with a correlation coefficient of 0.2808. The sex ratio and dependency ratio are positively correlated in the manufacturing and trade and commerce dominant settlements. (See Table No. 4.5).

The study shows that the services and agriculture settlements do not have any significant correlation with the demographic characteristic of settlements.

The distribution of settlement - on the basis of social amenities show that the class I, II and III settlements have higher Centrality score and higher order functions. The smaller and medium size of settlements have low centrality score (or low order functions). Especially the villages are more concentrated in the less than 10 centrality score range.

From the map (Fig. 1.8) we observed that lower order functions of settlements are mainly concentrated in the central region and high order functional settlements are along with the National highways and broad gauge lines.

From the study it is clear that educational facilities are inadequate 33.54 per cent settlements do not have primary schools 19.48 per cent high school, 92.33 per cent lack technical institutions 5.75 per cent do not have middle



schools and 87.85 per cent lack higher institutions including the colleges. The large sized villages thus do not have educational facilities.

As far as medical facilities are concerned 15.97 per cent of settlements are not having a dispensary, 44.72 per cent a hospital, 60.06 per cent maternity and child welfare centres and 58.46 per cent of rural health centres. So that it can be said in general way medical facilities are very poorly developed in the region.

In case in infrastructural facilities we find that there is a shortage of all the facilities except post office. It is observed that during the 1961 and 1971 Census those towns have been given urban status in the size class of IV and III. Due to the large concentration of industrial and manufacturing activities of settlements.

The highest number of settlements declassified during the 1961 in Central region. It has the fertile and multi-cropped areas and out of them most settlements are non-industrial. During the 1971 Census all declassified settlements have the agricultural status or primary activities only.

It is also observed that mainly Class V towns moved to class IV during the 1961 and 1971 Census.

A P P E N D I X I

	Size of Settle- ments 1	Code Number 2	Growth Rate 3	Sex Ratio 4	Density per sq. k.m. 5	Literacy 6	Dependency Ratio 7	Centrality Score 8
<b><u>District Anreli</u></b>								
1. Anreli	III	216	24.69	920	17404	50.06	236	48.50
2. Chital	V	212	9.34	960	3791	30.19	201	19.48
3. Vadiya	V	214	14.85	939	22261	42.75	234	16.95
4. Nagarara	IV	217	19.56	971	3065	38.69	208	20.64
5. Babra	V	213	18.05	955	4040	37.82	196	16.11
6. Lathi	IV	215	18.70	932	771	32.57	202	22.85
7. Dam Nagar	V	224A	7.92	953	975	40.29	345	12.90
8. Dhari	IV	220	124.86	896	12970	41.01	195	23.31
9. Chalala	X	219	23.54	973	839	48.89	157	15.81
10. Hajula	IV	221	31.22	945	15594	35.96	223	23.58
11. Jafrabad	V	223	9.19	1018	7967	29.24	202	13.63
12. Kodinar	IV	224	20.66	915	11426	46.63	195	18.78
13. Lillia	VI	218	24.80	975	4277	33.10	224	12.83
14. Dungar	VI	222	18.66	942	1599	31.65	163	21.58

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Appendix 1...contd.

	1	2	3	4	5	6	7	8
<u>District Ahmedabad</u>								
15. Dholka	III	73	37.29	904	18317	41.54	189	33.65
16. Ahmedabad	I	64	45.86	805	32031	52.74	222	1301.95
17. Sarkhej	X	64A	49.12	876	2546	34.29	150	11.19
18. Odhav	X	61	66.09	787	1541	30.59	170	12.27
19. Hansol	X	69	38.71	919	5694	42.49	274	9.82
20. Mandal	X	63	34.05	996	335	37.26	114	12.21
21. Vatva	X	71	11.39	892	871	33.12	195	11.48
22. Bareja	X	72A	40.01	1072	840	39.24	131	11.26
23. Unvarsad	X	62	4.35	991	773	32.49	227	14.58
24. Dehgam	IV	70	49.31	875	18211	46.44	216	11.88
25. Dabhoda	X	59	20.80	951	710	32.01	149	25.13
26. Sanand	IV	65	34.75	918	28270	41.29	169	17.26
27. Bavla	IV	68	53.14	940	1436	42.56	103	21.98
28. Chaloda	X	72	14.98	887	800	35.15	189	9.82
29. Dhandhuka	IV	75	27.67	969	15640	45.67	229	28.55
30. Ran Pur	V	76	-1.36	1016	6423	45.80	205	12.50
31. Barvala	V	74	21.48	965	681	42.39	274	6.84

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Appendix 1 contd.

	1	2	3	4	5	6	7	8
32. Faroda	III	69	35.76	861	4245	39.24	213	12.66
33. Sahipur Bogha	III	67	124.87	843	10193	44.27	229	14.84
34. Virangam	III	66	41.99	916	11489	43.78	239	17.14
<u>District Broach</u>								
35. Broach	II	277	17.39	941	23754	51.00	234	74.92
36. Rajpipla	III	275	22.99	908	15407	51.13	222	33.15
37. Anklesvar	III	278	32.81	940	14490	51.32	191	31.05
38. Palej	X	276	16.03	820	3229	49.94	138	15.27
39. Jambusar	IV	273	29.50	914	10540	35.77	206	29.06
40. Kavi	X	272	23.44	931	422	39.20	220	6.98
41. Sarod	X	271	16.64	982	190	39.54	186	4.51
42. Amod	X	274	14.51	908	1468	51.96	173	23.15
43. Hansot	X	279	16.69	948	1132	36.19	160	13.65
<u>District Bhavnagar</u>								
44. Bhavnagar	I	203	27.92	916	19436	49.19	284	478.32
45. Mahuva	III	211	22.42	920	2550	41.41	242	38.46

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Appendix 1 .. contd..

	1	2	3	4	5	6	7	8
46. Savarkundla	III	209	38.54	936	31051	38.20	222	40.49
47. Palitana	III	207	0.20	922	5516	43.48	263	31.01
48. Botad	III	200	33.79	924	6542	41.23	217	28.82
49. Ghogho	V	209A	0.94	1186	1269	32.78	293	7.74
50. Vallabhipur	V	201	21.87	924	5526	38.14	168	18.30
51. Paliyad	V	199	7.27	962	29601	32.77	156	11.01
52. Gadhadamahal	V	208	9.32	935	3041	40.92	220	25.21
53. Sihor	IV	205	12.48	964	12210	46.62	260	29.31
54. Gariadhar	V	206	30.56	965	28684	33.06	183	28.46
55. Talaja	V	210	40.30	955	1284	46.65	280	49.02
56. Vartej	X	204	14.89	751	640	33.05	181	25.64
57. Unrala	VI	202	13.52	959	5429	41.33	165	13.49
<u>District Banaskantha</u>								
58. Palanpur	III	5	28.76	905	5298	42.75	260	134.45
59. Kanodar	X	6	32.45	872	1644	37.93	118	15.34
60. Virampur	X	4	33.36	915	572	2.36	101	5.07

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Appendix 1 Contd...

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
77. Okha	V	114	55.92	807	3353	37.12	208	5.89
78. Beyt	VI	113	8.45	969	763	26.87	251	5.20
79. Mithapur	IV	115	70.23	932	10684	35.61	237	15.18
80. Dwarka	IV	116	46.58	916	9542	47.07	256	20.24
81. Raval	X	122	13.99	971	339	25.01	195	8.67
82. Salaya	V	112A	12.25	1099	2456	23.11	340	11.96
83. Bhanvad Mahal	IV	121	41.68	993	1050	41.80	236	21.38
84. Latipur	X	114A	22.85	986	183	16.11	98	10.69
<u>District Junagarh</u>								
85. Junagarh	II	232	18.44	910	14288	50.36	274	65.93
86. Veraval	III	243	16.22	965	3099	34.00	257	39.01
87. Mangrol	III	233	4.99	977	1917	32.55	199	33.87
88. Bilkha	V	234	3.76	1006	31166	41.33	219	23.45
89. Visa Vadar	V	238	42.31	939	36636	40.39	237	17.15
90. Mordarda	V	235	33.10	918	3029	35.88	190	19.64
91. Bantwa	IV	230	24.45	971	1618	39.11	252	40.74
92. Manavadar	IV	229	41.38	918	2877	39.98	236	32.54
93. Keshod	IV	237	37.44	884	2788	42.04	225	27.91

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Appendix 1 contd.....

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
94. Vantthali	IV	239	4.12	967	3065	38.40	222	21.54
95. Patan	IV	231	15.51	988	1132	21.48	199	16.82
96. Sutrapada	X	239B	41.87	984	588	14.62	115	5.83
97. Matia	V	240	3.65	969	2204	41.61	192	14.79
98. Talala	VI	242	45.84	918	28747	33.34	165	12.15
99. Delvada	X	245	10.52	1067	922	30.73	204	15.73
100. Porbandar	II	225	27.63	932	19612	48.31	260	86.89
101. Chhaya	X	239A	43.27	851	421	36.74	154	10.73
102. Ranavav	V	226	19.89	1017	12997	35.28	244	11.73
103. Kutiyana	IV	227	7.01	483	32830	35.99	247	36.51
104. Shapur	X	228	54.86	850	954	40.69	178	3.51
105. Chorvad	X	236	13.22	961	1190	20.66	130	20.08
106. Una	IV	244	38.29	993	12878	35.32	244	19.86
107. <u>District Kutch</u>								
107. Anjar	III	15	20.73	1042	6651	38.74	244	41.07
108. Madhapur	X	13	44.33	1221	3037	30.82	217	15.12

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## Appendix 1 contd.....

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
109. Talia	X	14	31.54	1945	210	39.14	246	22.32
110. Mundra	V	16	14.37	1056	1100	43.56	247	30.18
111. Bhachau	X	10	54.99	912	301	32.10	225	12.35
112. Bhuj	III	11	29.67	944	12991	50.48	291	22.21
113. Manvi	III	17	9.19	1062	4627	49.42	246	75.67
114. Gandhidham	III	12	420.69	849	2651	50.84	99	41.38
115. Kandi	V	16A	60.79	740	300	23.05	202	37.01
116. Rapar	X	9	49.90	894	N A	26.70	242	12.63
<u>District Kaira</u>								
117. Nadiad	II	149	26.03	884	7232	57.49	271	95.99
118. Cambay	II	198	31.38	926	3142	46.04	224	55.56
119. Anand	III	172	57.01	808	4929	55.13	261	45.04
120. Patland	III	179	18.78	893	9926	48.85	286	43.55
121. Kapadvanj	III	138	133.23	902	16809	50.38	249	49.90
122. Porsad	III	183	19.70	926	2570	48.34	262	30.35
123. Umreth	III	184	13.76	932	3161	52.71	290	28.38
124. Vaso	V	150	85.28	957	1881	58.70	192	19.54
125. Mahudha	X	148	132.29	966	2022	43.41	613	21.96

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Appendix 1 contd...

	1	2	3	4	5	6	7	8
126. Alina	X	151	30.15	932	712	31.40	251	9.43
127. Pilj	X	158	12.12	909	871	59.90	253	15.12
128. Kanjari	X	181	19.55	896	1402	43.61	238	26.38
129. Uttarsarda	X	174	20.65	881	1748	54.11	264	28.37
130. Chaklasi	X	168	31.22	890	7053	35.28	219	32.03
131. Antrolli	X	139	24.30	893	731	33.08	187	6.52
132. Chhipadi	X	140	16.95	951	1985	29.26	275	5.82
133. Lasundra	X	147	28.09	899	445	28.86	129	6.79
134. Kaira	IV	145	55.04	930	24454	49.26	255	21.52
135. Mehmedabad	IV	142	32.32	929	6280	51.07	246	23.58
136. Parmuvada	X	144	10.72	1033	8196	18.24	234	3.45
137. Nodaj	X	143	31.60	1002	1086	20.50	181	6.23
138. Sirhaj	X	141	19.32	905	679	21.77	189	3.98
139. Matar	X	146	23.43	899	1080	40.65	229	19.49
140. Vallabhvidya Nagar	V	166	14.38	319	8315	60.65	403	36.48
141. Boriavi	X	169	22.30	870	1684	47.24	390	12.44

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## Appendix 1. contd...

	1	2	3	4	5	6	7	8
142. Bakroli	X	171	34.50	843	932	37.88	175	12.44
143. Chikhodra	X	165	22.70	898	1571	40.83	223	13.46
144. Ode	X	164	16.87	865	1022	45.03	235	16.66
145. Bhatej	X	167	23.55	922	1349	44.29	256	20.79
146. Khambholoj	X	160	18.89	860	902	46.07	151	13.59
147. Shili	X	159	18.62	896	740	18.51	142	3.40
148. Sarso	X	170	24.25	880	1079	47.48	240	18.53
149. Karamsad	X	170A	15.75	936	1334	51.73	282	17.66
150. Vapad Vanta	X	164	7.32	933	1692	22.17	215	7.43
151. Adas	X	163	9.71	894	995	41.24	211	15.17
152. Vasad	X	175	17.70	887	1050	51.74	245	18.51
153. Dakor	IV	157	19.48	882	3803	54.17	98	26.69
154. Pali	V	154	29.72	860	1449	35.86	202	13.50
155. Tharsa	X	156	34.41	901	14276	44.72	214	16.09
156. Anghadi	X	155	18.04	885	692	25.73	134	11.08
157. Balasinor	IV	153	19.12	906	21659	46.44	261	23.11
158. Janood	X	152	25.61	884	428	32.26	110	8.70
159. Sojitra	IV	176	1.22	998	26768	59.52	377	20.26
160. Dharmaj	V	188	3.78	962	1556	58.08	295	17.53

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## Appendix 1 contd.....

	1	2	3	4	5	6	7	8
161. Kasor	X	187	20.66	883	1087	40.37	219	8.39
162. Mahalar	X	188A	16.12	897	1129	42.78	244	11.94
163. Tarapur	X	177	12.34	923	762	45.59	224	16.00
164. Undel	X	197	17.95	867	1001	32.27	217	13.70
165. Bhadrar	V	186	6.14	955	1762	61.66	316	19.89
166. Kathana	X	196	-1.74	913	1517	28.29	120	10.37
167. Dahavan	X	195	3.97	918	1129	31.33	88	7.59
168. Davol	X	193	15.67	888	21091	36.51	181	10.68
169. Alarsa	X	194	20.85	906	1484	33.71	186	10.49
170. Anklav	X	185	21.48	893	1202	39.11	235	14.63
171. Sanarkha	X	181	14.39	897	1303	41.24	167	16.54
172. Vadod	X	182	24.46	868	1046	38.74	176	15.76
173. Nar	X	178	11.41	924	1301	58.28	272	18.38
174. Pandoli	X	190	16.37	881	1061	26.79	132	10.79
175. Sunav	X	189	22.10	942	1898	60.37	244	14.00
176. Virsad	X	191	6.73	914	982	45.42	228	12.12
177. Ras	X	192	21.00	902	1022	51.88	194	12.83

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## Appendix 1 contd..

	1	2	3	4	5	6	7	8
<u>District Mehsana</u>								
178. Patan	II	30	138.05	955	20781	46.82	239	67.53
179. Sidhpur	III	29	33.21	1012	8907	46.06	261	42.56
180. Mehsana	III	44	42.85	870	11233	46.87	226	27.04
181. Vad Nagar	IV	36	11.44	1005	10287	41.10	168	25.89
182. Kadi	III	55	16.13	920	21510	46.77	175	33.16
183. Kalol	III	56	42.38	826	10646	46.55	214	39.64
184. Unjha	III	34	32.48	1011	18867	52.19	157	16.53
185. Balisara	X	33	19.60	1020	843	49.88	130	5.29
186. Chanasma	IV	32	9.70	966	26902	53.60	200	11.20
187. Dbigoj	V	71	18.01	974	2594	44.60	152	13.18
188. Harij	V	31	28.75	861	779	36.24	215	10.80
189. Laghmaj	X	54	17.38	1010	680	46.21	146	10.52
190. Kheralai	IV	26	13.70	954	8548	37.62	155	12.46
191. Sundriya	X	37	21.17	1003	704	28.90	106	7.20
192. Vijapur	IV	48	17.98	961	23124	45.66	229	28.78
193. Mansa	IV	53	15.37	976	6192	38.62	230	24.36

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## Appendix 1 contd...

	1	2	3	4	5	6	7	8
194. Charada	X	38	12.87	1001	671	40.43	117	14.47
195. Lodhra	X	45	6.01	1012	1133	46.61	128	14.61
196. Rambheja	X	57	19.80	928	1188	42.87	119	13.46
197. Pethapur	X	58	8.52	1006	284	30.93	163	13.12
198. Sami	X	42	21.96	949	272	24.72	181	5.87
199. Linch	X	45	16.65	976	874	33.15	194	2.14
200. Sipor	X	27	22.50	1072	785	36.20	131	4.14
201. Vismagar	III	39	23.17	912	25983	47.31	197	10.59
202. Denap	X	28	32.90	1015	2089	48.40	102	4.14
203. Valam	X	40	14.90	1043	670	52.77	132	5.70
204. Umta	X	35	8.12	1074	523	46.63	118	2.92
205. Ladol	X	97	5.94	1086	504	47.17	129	13.36
206. Vasai	X	51	12.33	1064	905	43.87	274	19.19
207. Kolwada	X	44	20.21	1009	1117	47.96	<del>148</del>	19.17
208. Gozaria	X	52	10.56	1012	1033	47.82	169	20.20
209. Pilvai	X	50	9.82	975	939	41.76	196	17.24
210. Kolwada	X	46	8.62	985	748	37.34	101	4.96

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## Appendix 1 contd...

	1	2	3	4	5	6	7	8
<u>District Rajkot</u>								
211. Rajkot	I	92	47.00	927	13867	53.50	279	127.63
212. Morvi	II	89	23.25	934	13384	48.08	299	79.19
213. Gondel	III	94	21.65	932	18027	48.69	284	61.63
214. Jetpur	III	101	9.63	989	7796	44.83	239	33.96
215. Wankamur	III	91	34.22	985	12862	46.08	276	34.31
216. Jasdan	IV	93	24.83	966	636	34.72	204	19.02
217. Vichhiya	VI	95	17.35	952	3223	38.82	217	20.16
218. Vasavad	VI	100	6.89	1059	3868	28.55	270	14.61
219. Hoviya	X	99	16.59	978	2434	33.01	120	10.30
220. Tankara	VI	90	14.87	976	2309	34.60	163	13.43
221. Maliya	X	88	3.92	1007	2915	19.09	112	7.41
222. Jatalsar	X	102	52.38	908	799	38.60	191	15.27
223. Moti Harad	X	104	33.69	1007	333	45.37	105	28.39
224. Jam Kanioma	V	96	-2.08	918	554	34.23	153	11.12
225. Bhayavadar	IV	97	19.30	953	59274	43.80	161	22.02

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## Appendix 1. contd.....

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
226. Panchi	X	98	37.15	949	552	38.66	173	19.86
227. Dhank	X	106	40.45	991	326	25.98	193	7.23
228. Ehoraj	III	103	11.79	1049	8158	42.98	270	16.90
229. Uplata	III	105	21.45	1084	23010	42.68	317	13.96
<b><u>District Surandra Nagar</u></b>								
230. Limbdi	III	86	19.18	949	10900	48.48	246	40.82
231. Sayla	V	84	27.85	986	8392	30.54	184	14.99
232. Halvad	V	77	16.97	1054	2381	41.05	316	14.89
233. Wadhwan	III	83	15.92	997	3814	45.43	259	16.87
234. Dhrangadhra	III	78	26.22	954	8119	46.50	156	32.11
235. Surandranagar	III	80	41.88	899	25856	48.80	266	26.53
236. Muli	V	81	18.09	916	527	33.07	170	11.45
237. Thangadh	V	82	41.79	947	82696	38.69	139	13.74
238. Chotila	V	85	34.77	932	1406	33.14	275	21.93
239. Chda	V	87	23.65	998	6520	33.76	274	20.24
240. Lakhtar	V	79	23.04	986	3372	37.23	246	15.65

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## Appendix 1 contd..

	1	2	3	4	5	6	7	8
<u>District Sabarkantha</u>								
241. Yadal	X	22	61.68	978	507	30.11	133	20.00
242. Khedbrahma	X	18	80.11	852	6625	35.15	165	11.31
243. Himat Nagar	IV	20	59.28	785	13897	50.52	208	29.06
244. Prantiji	IV	21	20.76	940	19853	44.99	268	29.91
245. Madasa	IV	24	42.15	896	6950	48.45	223	38.38
246. Bayad	X	25	100.33	871	506	33.67	157	9.57
247. Talod	V	23	45.51	808	10812	48.21	222	10.45
248. Idar	IV	19	36.70	1102	9376	46.92	218	5.84
<u>District Surat</u>								
249. Surat	I	289	29.05	915	90316	56.55	214	94.21
250. Navsari	II	295	20.00	948	29777	55.23	243	63.02
251. Bular	III	303	47.74	965	24103	56.09	349	103.59
252. Bilimora	III	300	49.62	858	16627	53.77	324	31.66
253. Bhagva	X	281	20.26	1453	187	49.74	730	23.05
254. Kathor	V	282	34.78	967	1609	52.95	198	21.12
255. Katargam	IV	283	56.50	898	2671	44.18	167	11.70
256. Adajan	X	290	57.57	889	2047	40.50	119	7.29

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Appendix 1 contd.....

	1	2	3	4	5	6	7	8
257. Athwa	X	287	63.42	806	5526	53.82	238	32.57
258. Udhna	X	291	139.51	744	2426	29.93	74	15.24
259. Mandvi	V	285	13.82	960	2935	50.82	176	67.11
260. Vyara	IV	293	34.83	941	6109	47.64	207	28.87
261. Bardoli	IV	288	25.49	933	4349	47.68	168	49.83
262. Valood	V	294	14.88	1054	722	41.39	135	15.73
263. Vijalpare	X	292	39.64	937	3586	33.24	187	7.40
264. Gandevi	IV	298	34.04	990	6647	51.48	202	33.50
265. Bigari	X	301	22.11	1009	1332	38.88	132	10.27
266. Bansada	X	302	33.26	936	2613	45.67	193	17.08
267. Abrama	V	308	25.21	885	2730	41.42	232	17.91
268. Bhadeli Jagalda	V	305	4.19	1329	1258	32.78	394	13.83
269. Khergam	X	304	12.12	1103	935	38.17	113	16.79
270. Dharampur	V	307	91991	978	5882	40.46	179	32.54
271. Pardi	IV	306	12.00	990	2087	48.28	192	30.27
272. Yapi	IV	309	23.97	978	2365	49.51	182	30.36

contd.....

## Appendix 1. contd...

	1	2	3	4	5	6	7	8
273. Umarsadi	V	280	13.61	1010	1013	34.09	242	23.59
274. Pharasa	V	310	9.60	1108	414	31.07	158	30.91
275. Nasoli	X	311	-1.77	1026	852	30.07	163	14.09
276. Unbergaon	V	292	23.85	906	1325	53.19	790	15.21
277. Bandar	IV	284	38.32	1026	9376	53.08	252	11.18
278. Navagam	X	297	55.31	749	11916	28.83	143	7.61
279. Katol	X	286	39.91	1003	4368	46.21	200	21.16
280. Jalalpore	X	296	10.90	926	2099	47.36	194.	6.67
<u>District Panch Mahals</u>								
281. Gcdha	II	129	28.88	910	6731	48.50	275	66.56
282. Kalol	V	130	18.83	917	47306	50.85	265	17.45
283. Vejalpur	X	132	20.96	909	1438	51.73	219	16.65
284. Shivraipur	X	123	45.15	876	1057	26.55	213	13.48
285. Halol	X	136	36.60	914	1760	47.85	208	32.88
286. Shehera	X	125	47.98	940	818	35.55	272	13.68
287. Hunavad	IV	124	12.23	1038	3353	52.83	327	29.99
288. Santrampur	V	128	17.36	882	1648	58.33	224	17.88

contd.....

Appendix 1. Contd.. ...

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
289. Jhalod	X	126	28.00	943	1537	40.64	165	20.18
290. Limdi	X	127	23.59	915	910	32.39	113	22.92
291. Dohad	III	133	40.19	955	14193	35.21	271	71.62
292. Frelandganj	IV	131	78.07	801	14113	57.66	232	19.62
293. Dohad	X	135	14.79	979	735	11.49	207	-
294. Garbada	X	137	22.20	930	742	13.58	89	10.30
295. Devgad Baria	IV	134	12.29	898	2911	51.63	240	36.54
<u>District Baroda</u>								
296. Baroda	I	255	41.14	857	30703	55.16	258	297.93
297. Gorva	IV	254	54.63	821	3167	43.00	215	15.84
298. Angadh	X	248	-4.81	948	1177	22.42	178	4.57
299. Sokhda	X	252	24.33	884	1438	46.63	221	14.49
300. Koyli	X	249	21.93	891	1101	47.99	227	7.47

contd.....

Appendix 1. contd.....

	1	2	3	4	5	6	7	8
301. Bhayali	X	250	20.86	873	737	46.74	197	9.32
302. Chhari	X	253	30.15	898	1678	45.86	174	6.63
303. Sauli	X	246	27.36	900	1559	41.81	287	7.48
304. Vaghodia	X	257	16.71	873	1000	34.17	191	10.62
305. Padra	IV	251	16.72	911	95277	50.99	254	11.65
306. Karjan	V	270	27.32	852	1338	44.72	203	11.61
307. Sinor	V	256	3.16	938	43819	46.65	238	9.99
308. Dabhoi	III	258	23.60	904	3353	51.98	239	9.76
309. Karvan	X	259	27.37	890	456	47.06	161	12.26
310. Bhadarpur	V	247	21.92	873	60180	45.72	167	13.37
3111 Sankheda	V	257	13.71	928	38389	54.29	269	11.70
312. Mankari	X	256	0.67	960	553	23.57	111	5.82
313. Chhota Udaipur	IV	260	24.15	887	10829	45.63	255	17.87

APPENDIX II  
LIST OF DECLASSIFIED TOWN'S  
DURING THE 1961 AND 1971.

1961	Map Location Code No.	POPULATION		
		1971	1961	1951
<b>I JAMNAGAR</b>				
1.	Dhaafa	4600	5060	4420
2.	Balarbha	6258	5691	4742
3.	Reval	7679	5465	4794
<b>II RAJKOT</b>				
4.	Panahi	9725	6947	5065
5.	Moviya	7936	6254	5364
6.	Atkot	4700	3411	2757
7.	Kotla Sangani	4799	4194	4219
8.	Lochari	3143	4069	3664
<b>III SURENDRA NAGAR</b>				
9.	Dasada	4652	4435	3597
10.	Patdi	9947	7943	6072
<b>IV ANRELI</b>				
11.	Chalale	9517	7240	5860
<b>V JUNAGADH</b>				
12.	Chorwad	11857	9900	8744
13.	Delwada	6672	5564	5034
14.	Sardargadh	3979	3136	2703
15.	Madhavpur	6007	4765	3945
16.	Sutrapada	6913	6576	4635
17.	Shahpur	4891	6800	4891
<b>VI KUTCH</b>				
18.	Madhapar	9998	7566	5242
19.	Bhachau	10023	7545	4868
20.	Rapar	7203	5377	3487
21.	Jakhau	3058	3048	2699
22.	Adhori	5110	4984	4967

1961	Map Location Code No.	POPULATION		
		1971	1961	1951
<b>VII SABAR KANTHA</b>				
23.	Vadali	10030	8414	5881
<b>VIII MEHSANA</b>				
24.	Pethapur	7304	6306	5806
25.	Randheja	7500	6510	5434
26.	Sundhi	8716	7137	5890
27.	Unta	7508	6629	6131
28.	Balisana	7981	6815	5698
29.	Unava	9282	7979	7027
30.	Charada	7570	6138	5438
31.	Gojharla	7902	6606	5975
32.	Kukarvada	8285	6220	5174
33.	Lodol	10644	8167	7709
34.	Vasai	8964	6820	6071
35.	Valem	7241	6104	5312
<b>IX AHMEDABAD</b>				
36.	Dabhoda	4771	6328	5238
37.	Mandal	9282	7818	5832
38.	Achar +	-	-	18377
39.	Vadaj +	-	-	10992
40.	Amraiwadi +	-	-	7354
41.	Rakhial +	-	-	6573
42.	Khekhara Mehmedabad	-	-	5534
<b>X KAIRA</b>				
43.	Adas	8330	6789	6188
44.	Bhalaj	9449	7617	6165
45.	Bariari	10960	8340	6819
46.	Chikhodre	9328	7728	6324
47.	Karamsad	11678	9282	11018
48.	Naparivante	7610	5524	5184
49.	Ode	16620	13022	11142
50.	Samarkha	13113	10702	9355

1961	Map Location Code No.	POPULATION		
		1971	1961	1951
<b>X Kaira conold.</b>				
51.	Sarsa	10804	9427	7887
52.	Vadod	9223	7830	6291
53.	Anklev	11942	9894	8144
54.	Tarapur	8140	6533	5833
55.	Kathal	10006	8602	6796
56.	Matar	8797	6921	5283
57.	Chaklashi	20211	16729	12748
58.	Mahudha	6640	10783	9127
59.	Pij	6519	5771	5147
60.	Mehlav	-	6902	5941
61.	Mar	7927	8354	7498
62.	Thasra	9851	8335	6201
63.	Napad Talpad	5325	3960	3511
64.	Birpur	-	4648	3998
65.	Attarsumba	-	2700	2414
<b>XI PANCHMEHALS</b>				
66.	Halol	14629	11053	8091
67.	Jhalod	12922	10089	7882
<b>XII BARODA</b>				
68.	Savli	11334	9522	7476
69.	Vaghodia	7551	5796	4966
<b>XIII BROACH</b>				
70.	Amod	10256	8970	7833
71.	Hasot	9405	7093	6078
72.	Kavi	8104	6698	5426
<b>XIV SURAT</b>				
73.	Bensda	7108	5937	4455
74.	Kadod	8177	8259	7202
75.	Varlav	3898	2865	2735
76.	S9ngadh	7166	4795	2858
77.	Khaltalwada	9108	8063	7090
78.	Maroli	2168	6154	5265

1971	Map Location Code No.	POPULATION		
		1971	1961	1951
<b>I RAJKOT</b>				
1. Maliya		7453	5830	5610
2. Jamkandorna		6674	5030	5137
3. Bhayavadar		15576	12318	10325
4. Vasavad		5549	4836	5139
<b>II SURENDRANAGAR</b>				
5. Muli		8435	7597	5982
6. Chuda		8988	8150	7430
<b>III AMRELI</b>				
7. Chital		7080	7583	6948
8. Lilia		5081	4277	3909
<b>IV Mehsana</b>				
9. Dhinch		8964	7569	6423
<b>V KHEDA</b>				
10. Dharmaj		9208	8718	8441
11. Bhadran		7668	7051	6643

Note : 1+ which were treated as separate urban unit in 1951 census, have been merged with Ahmedabad Municipal Corporation in 1961.

2 Gorwa with Baroda, Rander with Surat and Ahmedabad military cantonment to the Ahmedabad Cantonment merged in 1971.



APPENDIX III  
LIST OF NEW TOWNS ADDED  
DURING THE 1961 AND 71  
CENSUS.

1961

NAME OF TOWN	DISTRICTS
1. Sikha	Jamnagar
2. Badi	Jamnagar
3. Tankara	Rajkot
4. Dungar	Amreli
5. Talala	Junagadh
6. Kandla	Kutch
7. Ahmedabad Cantt (civil)	Ahmedabad
8. Vallabhvidyanagar	Kaira
9. Pali	Kaira
10. Shivrajpur	Panch Mahals
11. Freelandganj	Panch Mahals
12. Gorwa	Baroda
13. Katargam	Surat
14. Jalalpur	Surat
15. Abrama	Surat
16. Pardi	Surat
17. Vani	Surat

1971

1. Jetalsar	Rajkot
2. Padipari	Rajkot
3. Patdi	Surentranagar
4. Kharaghoda	Surentranagar
5. Vartej	Bhavnagar
6. Chalala	Amreli
7. Chhaya	Junagadh
8. Adityana	Junagadh
9. Shapur	Junagadh
10. Dalwada	Junagadh
11. Madhapar	Kutch
12. Naliya	Kutch
13. Rapar	Kutch
14. Nakhilrana	Kutch

Name of Town	Districts
1971 Continued	
15. Bhachu	Kutch
16. Kanodar	Banaskantha
17. Juna Deesa	Banaskantha
18. Varahi	Banaskantha
19. Bhabhar Nava	Banaskantha
20. Khod Brahma	Sabar Kantha
21. Dhansura	Sabar Kantha
22. Gandhinagar	Gandhinagar
23. Sardarnagar	Ahmedabad
24. Ochnav	Ahmedabad
25. Danilimda	Ahmedabad
26. Hansol	Ahmedabad
27. Nikol	Ahmedabad
28. Sarkhej	Ahmedabad
29. Nandej	Ahmedabad
30. Mandal	Ahmedabad
31. Vasad	Kheda
32. Theera	Kheda
33. Halol	Panch Mahals
34. Fertilizer Nagar	Vadodara
35. Jawahar nagar	Vadodara
36. Vaghodia	Vadodara
37. Bodeli	Vadodara
38. Palej	Broach
39. Anod	Broach
40. Hansot	Broach
41. Uahana	Surat
42. Olpad	Surat
43. Kosanta	Surat
44. Songadh	Surat
45. Ukai	Surat
46. Atul	Valsad
47. Udvada	Valsad
48. Chikhli	Valsad
49. Bansda	Valsad

TABLE 2.0

district	Area in sq. Km A	Total Settle- ments B	M. N. D. (cm) C	$\bar{r}_a$ (C/B)	$P = \frac{H}{A}$ (B/A)	$\bar{r}_e$	$R = \frac{\bar{r}_a}{\bar{r}_e}$
1. Jan nagar	10412.1	19	47.7	25.105	0.0018	0.0848	2.128
2. Rajkot	11081.6	19	35.9	18.894	0.0017	0.0824	1.556
3. Surendrenagar	10172.5	11	24.2	22.000	0.0010	0.0632	1.390
4. Bhavnagar	9260.3	14	37.6	26.857	0.0015	0.0774	2.078
5. Amreli	6419.8	14	23.00	16.428	0.0021	0.0916	1.504
6. Junagadh	10621.1	22	38.6	17.545	0.0020	0.0894	1.568
7. Kutch	42909.3	10	48.7	48.700	0.0002	0.0282	1.673
8. Banas Kantha	12039.9	8	25.2	31.500	0.0007	0.0529	1.666
9. Sabar Kantha	7083.6	8	17.3	21.625	0.0011	0.0663	1.433
10. Mehsena	9333.0	33	39.7	12.030	0.0035	0.1183	1.423
11. Ahmedabad	8918.7	20	32.8	16.400	0.0022	0.0938	1.538
12. Kaira	6917.4	61	30.6	5.0163	0.0088	0.1876	0.941
13. Panch Mahals	8937.0	15	24.8	16.533	0.0016	0.0800	1.322
14. Baroda	7803.4	18	21.8	12.111	0.0023	0.0959	1.161
15. Broach	7731.7	9	17.4	19.333	0.0011	0.0663	1.281
16. Surat	12628.6	32	48.4	15.125	0.0025	0.1000	1.502

Table Number 2.1

The concentration of settlements in the study units of Gujarat, 1961.

DISTRICT	Total Area in sq. Km	Total Settlements	Total Area to district area percentage	Total settlement to district settlements Percentage	Order		Cumulative percentages			
					X	Y	Xi	Yi	Xi Xi+1	Yi Yi+1
1. Jamnagar	10412	19	5.56	6.07	3.70	19.49	3.70	19.49	111.11	-
2. Rajkot	11061	19	5.90	6.07	4.98	10.54	8.69	30.03	349.31	169.17
3. Surendranagar	10172	11	5.43	3.51	6.75	10.22	15.43	40.25	709.78	463.36
4. Bhavnagar	9260	14	4.94	4.47	4.16	5.75	19.59	46.00	1026.12	788.49
5. Amreli	6419	14	3.43	4.47	4.76	6.38	24.35	52.38	1384.29	1120.10
6. Junagadh	10621	22	5.68	7.03	3.43	4.47	27.78	56.85	1774.58	1455.11
7. Kutch	47909	10	25.58	3.20	5.68	7.03	33.46	63.88	2340.52	1902.20
8. Banaskantha	12039	8	6.45	2.56	5.56	6.07	39.02	69.95	2966.30	2492.59
9. Sabar Kantha	7083	8	3.78	2.56	5.90	6.07	48.92	76.02	3629.98	3142.15
10. Mehsana	9333	33	4.98	10.54	4.77	4.79	49.69	80.81	4235.57	3777.43
11. Ahmedabad	8918	20	4.76	6.38	4.94	4.43	54.63	85.24	4813.44	4414.65
12. Kaira	6917	61	3.70	19.49	4.13	2.87	58.76	88.11	5327.76	5008.70
13. Panch Mahals	8937	15	4.77	4.79	3.78	2.56	62.51	90.67	5890.01	5510.39
14. Baroda	7803	18	4.16	5.75	5.43	3.51	67.97	94.18	6575.41	6162.83
15. Baroach	7731	9	4.13	2.87	6.45	2.56	78.42	96.74	7442.00	7008.87
16. Surat	12628	32	6.75	10.22	25.58	3.26	100.00	100.00	-	9674.00
Total	187243	313	100.00	100.00					48576.31	53090.04

**Table No 2.2**  
**The concentration of population ratio in study units of Gujarat State 1961.**

District	Total population of district	%total state pop. to the district pop. X	Total study units pop. of district	%total state study units pop. to district population Y	%total district pop. to total district study unit pop.	X	Y	XI	XI	YI	XI+1	XI	YI	+1
1. Junnagar	828419	4.02	444276	6.93	53.62	10.74	21.98	10.74	21.98	310.49	-			
2. Rajkot	1208519	5.88	504652	7.85	41.23	4.02	6.93	14.76	38.91	542.57	324.42			
3. Surendranagar	663206	3.23	193585	3.04	29.18	5.88	7.85	20.64	36.76	984.73	596.70			
4. Bhavnagar	1119435	5.44	357705	5.57	31.95	9.62	10.95	30.26	47.71	1612.25	1112.35			
5. Amreli	667823	3.24	154939	2.41	23.22	5.44	5.57	35.70	53.28	2119.86	1703.24			
6. Junagadh	1245643	6.06	392270	6.10	31.49	6.06	6.10	41.76	59.38	2774.53	2224.97			
7. Kutch	696440	3.38	161527	2.51	23.19	7.42	7.06	49.18	66.44	3417.02	2920.30			
8. Banaskantha	996144	4.86	92195	1.43	9.25	3.23	3.04	52.41	69.48	4189.20	3486.10			
9. Sabar Kantha	918587	4.90	89131	1.38	9.70	11.92	10.36	64.33	79.24	5561.97	4469.64			
10. Mehsana	1669963	8.24	425243	6.62	25.16	8.21	6.62	72.54	86.46	6446.62	5791.59			
11. Ahmedabad	2210199	10.74	1411728	21.92	63.87	3.24	2.41	75.78	88.87	6934.77	6551.93			
12. Kaira	1977540	9.62	703244	10.95	35.56	3.38	2.51	79.16	91.38	7441.04	7034.96			
13. Panch Mahals	1468946	7.15	204986	3.19	13.95	4.33	2.62	83.49	94.00	8114.39	7629.31			
14. Baroda	1527326	7.42	453128	7.06	29.66	7.15	3.19	90.64	97.19	8938.91	8520.16			
15. Daresochi	891969	4.33	167114	2.62	18.73	4.66	1.43	95.50	98.62	9550.00	9201.64			
16. Surat	2451624	11.92	665312	10.36	27.13	4.50	1.38	100.00	100.00	-	9862.00			
<b>Total</b>	<b>20561783</b>	<b>100.00</b>	<b>6421032</b>	<b>100.00</b>						<b>60928.35</b>	<b>71505.34</b>			

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