Unit 2 ❑ POPULATION PROBLEMS OF THE THIRD WORLD

Structure

2.1 BACKWARD CLASSES

The backward classes form a very important section of Indian society, accounting for more than 30% of the total population of the country. They are, however not homogeneous category but consist of three broad divisions : the scheduled castes, the scheduled tribes and other backward classes. Of the three problems of the other backward classes [OBCs] are in many ways different from the first two. However, the condition of all the three groups is intimately linked with the basic features of traditional Indian society and nature of their problems can be understood only in terms of these features and change and continuity. (D. C. Bhattacharya : **Sociology)**

The term 'Backward Classes' broadly refers to the category of the people who have been designed as 'backward' by the Government and are entitled to get certain special benefits and privilege conferred by the Government. Andre Beteille observes that the use of the term Backward Classes is not altogether happy one because the word class denotes not only an economic category but also one which is relatively open. In reality, the Backward Classes are not classes at all but an aggregate of closed status groups.

Of the three categories of Backward Classes, the Position of the Scheduled Castes and Scheduled Tribes is defined, more or less specifically, in the Constitution of India but the Position of the OBCs is not clearly mentioned in the Constitution. Their position was not defined in specific terms until recently. The OBCs are now entitled to special facilities in education and employment. But unlike the SCs/STs, they are not given the privilege of political representation through reserved Constituencies.

Officially defined in terms of caste and occupation, the OBCs would comprise intermediate agricultural and functional castes. They are higher than the Scheduled Castes or Dalitas in the caste hierarchy. Andre Beteille considers peasant pastes the core of the OBCs. They are at a lower rung in the caste hierarchy. They have certainly been far behind the upper castes in education, profession and government jobs and white-collar occupations in general. Inspite of this, such castes are small landowners and often they include 'dominant castes' who have advanced politically. They now consolidate power against politically weaker sections of the society which may appear threated their dominance.

Since independence the position of the Backward Classes has improved as a result of the social-economic forces generated by state-sponsored economic development and the process of political democratization. Caste-based segregation is now an offence. The abolition of landlordism and land reforms undertaken in various states have given to the Backward Class people ownership rights to land which they Cultivated as tenants. Adult franchise has generated consciousness for political mobilization and participations. All theses factors and the Green Revolution have made the OBCs economically and political important in India Society.

WELFARE OF BACKWARD CLASSES

Department of Women and Child Development in the Ministry of Human Resource Development has formulation polices and programmers for women and children beside coordinating, guiding and promoting the activities of both governmental and non-governmental organizations working for the welfare and development of women and chi'dren. The major thrust programmes of the department is towards ensuring the well-being of children and women, particularly those of the weaker sections of society and for raising the status of women and bringing them into the mainstream of development. The Department comprises of the Nutrition and Child Development Bureau and the Women's Development Bureau. While the Nutrition and Child Development Bureau is responsible for the overall Development of children, the Women's Bureau works to improve the lot of women. The National Institute of public cooperation and child development (NIPCCD), a society registered under the Societies Registration Act 1860, functions under the department. Its activities include research and evaluation studies, organization and conduct of training programmes for functionaries, organisation of workshops/ seminars and conferences in the area of women and child development. NIPCCD is also responsible for the training of functionaries of the department's most significant programme, the integrated child development service (ICDS). The Central Social Welfare Board (CSWB), which is a registered body under the Indian companies Act of 1956, works as an apex body to promote voluntary action in the field of women and child development by extending financial

support to various non-govermental organisation in the country. It reaches even to the grass root level organization through its state boards.

CHILD DEVELOPMENT

(i) Integrated child development services

Following the adoption of the National policy for children in 1974, the scheme of integrated child development services (ICDS), was initiated in 1975 as a centrally sponsored scheme. The scheme provides a package of services namely : (1) Supplementary nutrition (2) Immunization (3) Health checkup (4) Health referral (5) pre-school non-formal education and (6) Health and nutrition education for mothers. The target group consist of children in the age group 0-6 years and pregnant and lactating mothers.

The number of projects (Centrally sponsored) sanctioned as on 31st march 1995 stood at 3,397 and 194 state sector project (rural/tribal blocks and urban block) 21.6 million (children and mothers) are receiving supplementary nutrition while about 10.1 million children are receiving re-school stimulation under the scheme. The integrated package of services as mentioned above is delivered through focal points of Anganwadis in which sanctioned number is over 3.9 lakhs. Several evaluation studies have brought out that ICDS is currently fulfilling a major National need and there has been a decline in infant mortality rates and birth rates, better health and immunization coverage and larger acceptance of family planning in ICDS areas.

In 1994-95 the financial provision for ICDS was Rs 444.99 crore. This account for all components on projects expenditure except the nutritional components which is funded by the state governments. For nutrition components apart from state government's contribution, food aid is also available from cooperative for American Relief Everywhere (CARE), World Food Programme (WFP) and through the eastwhile centrally sponsored wheat based nutrition programme. A beginning was made to institutionalize a special set of intervention for adolescent girls through ICDS infra-structure these interventions for adolescent girls were sanctioned in 507 ICDS project; The services provided include health and nutrition cover functional literacy and upgradation and improvement of home-base skills.

(ii) World bank assisted ICDS project

The centrally sponsored, world bank assisted ICDS project provides additional inputs for women's income generation. Women's integrated learning of life (WILL), services for adolescent girls, strengthening of health components, experimentation with nutritional rehabilitation centres and therapeutic food, construction a Anganwadi buildings and godowns-cum-CDPO'S offices on a selective bases and enhanced

inputs in the spheres of communications, training, project management, equipment, monitoring, evaluation etc.

(iii) Training of ICDS functionaries :

The effective delivery of the package of services envisaged under the significant programme of ICDS depends on proper training and orientation of the functionaries at all levels. Accordingly a comprehessive programme for the training of ICDS functionaries has been under taken concurrently by this department.

(iv) Balsevika traning programme

With the rapid expansion of welfare schemes in the country such as the Integrated Child Development Services Scheme the demand for the grass root level functionaries to the rise. The Balsevika Training Programme was started in 1961 - 62 to meet the requirement of the trained personnel for the institutions implementing welfare programmes for the pre-school children.

(v) Creches/Day-Centers For Children

Under the scheme, the services available to the children include sleeping and day-care facilities, supplementary nutrition, Immunization, Medicines, entertainment and weekly medical check-ups, being implemented by the Central Social Welfare Board.

(vi) Early Childhood Education (ECE)

ECE has been designed to improve the children's communication (language) and cognitive (social, emotional, intellectual, and personality development) skills as preparation for entry into primary schools, implemented in the nine educationally backward states of Andhra Pradesh, Assam, Bihar, Jammu & Kashmir, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal.

(vii) Special Nutrition Programme (SNP)

(viii) Wheat Based Nutrition Programme (WBNP)

The Wheat based nutrition programme is being implemented in 16 state and three union territories to cover about 31 lakh beneficiaries in ICDS areas.

(ix) Infant Milk Substitutes, Feeding Bottles and Infant Food Act, 1992

(x) National Plan of Action for Children,

(xi) Balwadi Nutrition Programme,

(xii) National Awards For Child Welfare.

(xiii) United Nation's International Children Emergency Fund (UNICEF)

Department of Women and Child Development is the nodal department for UNICEF assistance in the country. UNICEF assistance has been available for the programmes which has focus on children. The programme areas, includes child development services, urban basic services, women development, health, nutrition, education, water supply and sanitation.

2.2 WOMEN DEVELOPMENT

The constitution of India guarantees equal rights and opportunities for both men and women . Towards this , efforts are being made through development planning to raise the status of women besides mainstreaming them into the process of national development on par with men. The programmes for the development of women include employment and income generation programmes , welfare and support services and programmes to create awareness generation. Etc.

(a) Hostels for Working Women

The scheme seeks to provide cheap and safe accommodation for working women belonging to low income group.

(b) Employment and Income Generating Training Production Unit

The NORAD (Norwegian Agency for International Development) assisted programme started during 1982-83 to train women belonging to weaker sections of the society and to provide them employment on a sustained basis.

(c) Condensed Courses of Education and Vocational Training For Women

This programme is implemented by the Central Social Welfare Board (CSWB) through voluntary organizations. Under this programme, women in the age group 18-30 years who have had some schooling, are coached for 2-3 years to enable them to appear at different levels of examinations like middle school/secondary school/matriculation.

(d) Socio-Economic Programme

Under this programme, the Central Social Welfare Board gives financial assistance to voluntary organizations for undertaking wide variety of income generating activities and provides opportunities for work and wages to needy women belonging to the category of poor and the downtrodden, widows, destitutes, disable, etc., particularly from economically backward and underdevelop areas.

(e) Support to Training-cum-Employment Programme

This programme of support to Training -cum-employment for women (STEP)

living below poverty line, was launched in 1987 to strengthen and improve the skill and employment opportunities in traditional sectors where majority of women are already working. The sectors include agriculture animal husbandary, dairying, fisheries, handlooms, handicraft, cottage and village industries and sericulture.

(f) Women Development Corporations

The Scheme for setting up of women Development Corporation (WDCs) was formulated in 1986-87. These corporation are expected to play a catalytic role in identifying the women entrepreneurs; provide technical consultancy services; facilities availability of credit, promote marketing of product; promote and strengthen women's cooperatives; arrange technical facilities, etc.

(g) Short Stay Homes for Women and Girls

Governments give grant-in-aid to voluntary organizations/institutes to assest/run short stay homes for women and girls. The scheme was started with the object of providing temporary shelter and rehabilitation to those women and girls who are in social and moral danger due to family problem., mental strain, social ostracism, exploitation or other causes.

(h) Awareness Generation Projects for Rural and Poor Women

(i) Education Work for Prevention of Atrocities Against Women

(j) Information and Mass Education

Problem awareness about social problem and consequent effort to bring the desired behavioural changes are envisaged to be achieved through the use of mass-media including electronic, print, traditional media and outdoor publicity, utilizing the outlets of Information and Broadcasting Ministry AIR, Doordarshan, Field Publicity, DAVP, Song and Drama etc.

(k) Rehabilitation of Women in Distress

The major object of the scheme is to rehabilitates destitute women and their dependent children through vocational training and residential care and make them economically independent.

(1) National Commission for Women (NCW)

A National Commission for Women was set up on 31st January 1992 to monitor the matters relating to constitutional and legal safeguards provided for women to monitor the implementation of legislations made to protect the rights of womens, review the existing legislations concerning women and suggest amendments.

WELFARE OF THE DISABLED

According to the estimates of the world Health Organisation (WHO), 10 percent of the population in the world has one or more physical or mental disabilities. In a sample survey conducted in 1981 by the National Sample Survey Organisation of India, the total number of disabled persons in the country may be about 120 lakh who suffer from speech, hearing and visual disabilities.

Rehabilitation Council

Rehabilitation Council has been set up as an autonomous body during 1992-93. the council prescribes minimum standard of education and training of professionals; recognizes or diplomas. The council also recognizes foreign degree or diplomas or certificates on reciprocal basis and maintain Central Rehabilitation Register of persons who are allow to practice or seek employment in rehabilitation services for the handicapped.

Prohibition and Drug Abuse

In keeping with its responsibility for drug abuse prevention, the Ministry of Welfare has been sponsoring a variety of research studies on the subject through major academic and research institutes. Recently, a nationwide project covering 33 cities and drug prone areas was commissioned by the Ministry to ascertain the nature and extent of the problem, to delineate the major socio-economic factors contributing to it, to identify areas and populationgroup afforts or susceptible to it, and to assess adequacy or otherwise of the available services.

Department of Pension and Pensioner's Welfare

The Department of Pension and Pensioner's Welfare was set up in March 1985. Its responsibilities include formulation of policy and coordination of matters relating to the retirement benefits of all Central Government employees. The department has also provided an integrated approach to matter relating to post-retirement benefits.

2.3 POVERTY

Man is the superior from of life and has special capacity and potential for reflection. Man through his actions has brought radical changes over the earthy surface. Despite tremendous development in the field of science, education and technology , there are glaring inter-regional disparities in the social, economic, cultural and political empowerment of men and women. These disparities are the main causes of insecurity in life of people and have led to many wars and conflicts.

It is a fact that the world can never be at peace unless people have security in their daily lives. Future conflicts may often be within nation rather than between them - with their origins buried deep in growing socio-economic deprivation and disparities. The search for securities in such a milieu lies in development, not in arms.

Human Development Index

The Human Development Index (HDI), developed and applied, for the first time in 1990, is a device to measure a country's or region's achievements in the enhancement of human capabilities. This index helps in ascertaining the impact of planning on the quality of life of people of a country. It was realized by the various development agencies of the UNO that there is a silent crisis in the world - a crisis of underdevelopment, of disparity in development, of global poverty, of ever mounting population pressure, of over consumerism, and thoughtless degradation of resources. To overcome this crisis, it is imperative to have a long, quiet process of sustainable development.. In fact, the world can never be at peace unless people have security in their daily lives. It will therefore, not be possible for the community of nation to achieve any of its major goal - not peace, not environmental protection, not human right or democratization, not fertility reduction, not social integration - except in the context of sustainable development.

What does the HDI include?

The HDI is a composite of three basic components of human development: (i) longevity, (ii) knowledge, and (iii) standard of living. Longevity is measured by life expectancy. Knowledge is measured by the combination of adult literacy (2/3 weight). Standard of living is measured by purchasing power based on real GDP per capita as adjusted for the local cost of living (purchasing power parity, or PPP).

The 1995 HDI is based on the following indicators:

(1) Life expectancy at birth

(2) Measurement of the health status and longevity.

(3) Educational attainment to represent the level of knowledge and skills

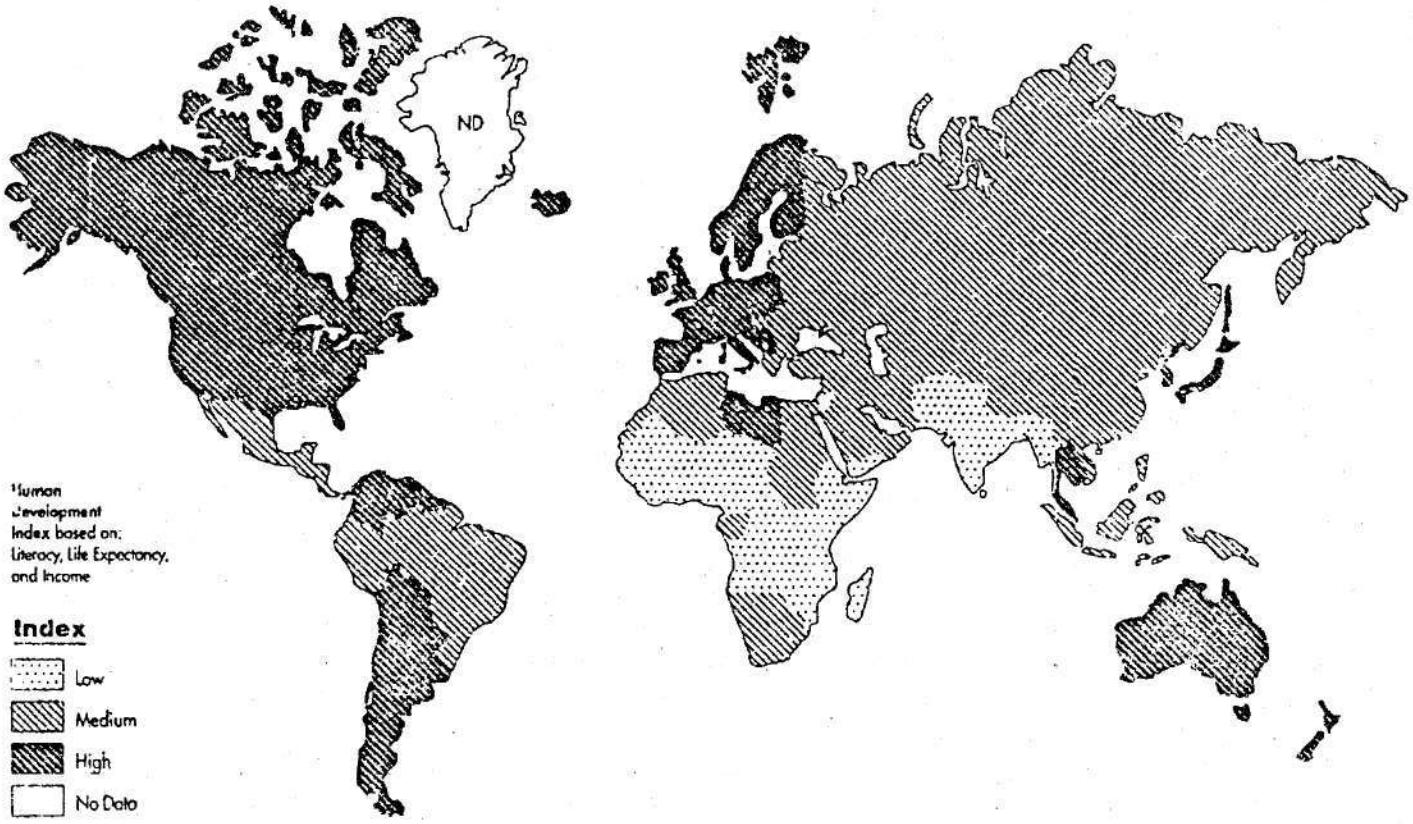
(4) An appropriately adjusted real GDP per capita (in PPP $), to serve as asurrogate for command over resources

The latest Human Development Report, 2005, has however included the following criteria :—

(1) Life expectances at birth year, 2003

(2) Adult literacy rate (% ages 15 and above), 2003

(3) Combined gross enrolment ratio for primary, secondary and tertiary schools (%), 2002-03.



Source : United Nation's Development Programme, Human Development Report, 1997

(4) GDP year capita (in ppp US $)

by applying data, UNDP has calculated the following indices :—

(a) Life expectancy index.

(b) Educational Index.

(c) GDP index.

POVERTY IN DEVELOPING COUNTRIES

A substantial proportion of population in each of the developing countries is below the poverty line. The population below the poverty line is unable to meet minimum human needs, such as adequate food, clothing, shelter, health, care and education, even by developing world standard.

Inspite of its widespread existence, estimates of absolute poverty are difficult to obtain for a number of reasons. It is not only that reliable and comparable data is not available, the indicators like lack of security, lack of political freedom, inability to participate freely in the life of a community and threats to sustainability cannot be measured and quantified. Moreover, a major difficulty also stems from the arbitrary nature of the definition of poverty line itself.

The question is: What is the standard poverty line below which absolute poverty exists? This is a problematic question in the context of the Third World, where the level of tolerance of poverty and survivability under difficult circumstances is considered to be remarkably high.

The main importance of Human Poverty Index (HPI) lies in the fact that it draws attention to deprivations in three essential elements of human life, i.e., longevity, knowledge and decent living standard.

The main difference between the HDI and HPI is that the former measures progress in a community or country as a whole, while the later HPI measures the extent of deprivation of the proportion of people in community/country who are left out of progress.

The Population Divisions of the UNO and the UNDP have estimated the HPI for 77 developing countries with comparable data and the results have been presented in Table7.11. The HPI value reflects the proportion of people affected by the three key deprivations-providing a comparative measure of the prevalence of human poverty.

Focus on Terminology : Human Poverty Index and Human Development Index

To overcome the limitation of taking a single measure of per capita income (PCI) as an index of development and the problem of using *PCI* as a measure of living standards, the United Nations Development Programme (UNDP) has developed two alternative indices by which to compare the level of development and the progress of countries : the human poverty index (HPI) and the human development index (HDI). These indices give alternative measures of the economic well-being of nations that do not necessarily accord with the level of PCI. As the UNDP says in its *Human Development Report* (1997) 'although GNP growth is absolutely necessary to meet all essential human objectives, countries differ in the way that they translate growth into human development'. The UNDP defines human development as 'a process of enlarging people's choice'. This depends not only on income but also on other social indicators such as life expectancy, education, literacy and health provision.

The human poverty index is based on three main indices :

(i) The percentage of the population not expected to survive to the age 40 (P_1);

(ii) The adult illiteracy rate (P_2) ; and

(iii) A deprivation index based on an average of three variables : (a) the percentage of the population without access to safe water; (b) the percentage of the population without access to health services and (c) the percentage of underweight children under five years of age (P_3).

The formula for the HPI is given by :

$$HPI = [(P_1^3 + P_2^3 + P_3^3) - 3]^{1/3} \quad \ldots (1)$$

The human development index is based on three variables :

(i) Life expectancy at birth

(ii) Educational attainment, measured by a combination of adult literacy (two-thirds weight) and combined primary, secondary and tertiary school enrolment ratios (one-third weight)

(iii) Standard of living measured by real PCI in terms of a common currency (such as the US dollar).

To construct the index, fixed minimum and maximum values are taken for each of the variables. For life expectancy at birth the range is 25-28 years. For

adult literacy the rent is 0- 100 percent For real per capita income the range is $100 - 10000. For any component of the *HDI,* the individual indices can be computed according to the general formula :

$$\text{Index} = \frac{\text{Actual value} - \text{Minimum value}}{\text{Maximum value} - \text{Minimum value}} \quad \ldots (2)$$

The index thus ranges from 0 to 1. If the actual value of the variable is **the minimum, the index** is zero. If the actual value is equal to the maximum value, the index is one. **Let us take the example** of the expectancy in India. The life expectancy is 61.3 years and if we put **this value into equation** (1), we get (61.3 - *25)* / (85 - 25) = 36.3 / 60 = 0.60. Among the developing **countries, some** have much higher HDIs than PCI, and *vice versa.*

NO. Rankings of countries according to their HDI and PQLI values correlate fairly well with the per capital income rankings. The largest deviations are found in case of the oil-exporting countries, which have higher per capita income but low values on the social development indexes. Inspite of all these, the HDI is one way to combine important development indicators.

(Source : **Contemporary Development Economics :** Felix Raj et. al., Central, Kolkata)

Salient Features of Human Poverty Index for Developing Countries

1. The HPI ranges from 3 percent in Trinidad and Tobago to 62 percent in Niger.
2. The other countries in which the HPI is 1 or less than 10 percent are Chile, Uruguay, Singapore and Costa Rica.
3. HPI exceeds 50 per cent in Mali, Ethiopia, Sierra Leone, Burkina Faso and Niger.
4. The HPI exceeds 33 percent in 32 countries, implying that an average of at least a third of people in these countries suffer from human poverty.

Table—1

Human Poverty Indices (HPI-1) for Developing Countries, 1998

Country	*HPI-1 value (%)*	*HPI-1 rank*	*HPI-1 Rank minus HDI rank*	*HPI-1 rank minus $1-a-day poverty rank*
Trinidad and Tobago	3.3	1	-4	—
Chile	4.1	2	0	-13
Uruguay	4.1	3	-1	—
Singapore	6.5	4	3	—
Costa Rica	6.6	5	2	-15
Jordan	10.0	6	-15	-1
Mexico	10.7	7	-1	-9
Colombia	11.1	8	-1	-4
Panama	11.1	9	3	-13
Jamaica	11.8	10	-9	0
Thailand	11.9	11	1	7
Mauritius	12.1	12	1	—
Mongolia	14.0	13	-15	—
United Arab Emirates	14.5	14	7	—
Ecuador	15.3	15	1	-16
China	17.1	16	-13	-14
Libyan Arab Jamaliiriya	17.4	17	5	—
Dominican Rep.	17.4	18	-4	-7
Philippines	17.7	19	-8	-9
Paraguay	19.1	20	-4	—
Indonesia	20.2	21	-4	1
Sri Lanka	20.6	22	-1	8
Syrian Arab Rep.	20.9	23	7	—
Bolivia	21.6	24	-10	7
Honduras	21.8	25	-10	-16
Iran, Islamic Rep. of	22.2	26	11	—

Country	*HPI-1 value (%)*	*HPI-1 rank*	*HPI-1 Rank minus HDI rank*	*HPI-1 rank minus $1-a-day poverty rank*
Peru	23.1	27	7	-16
Tunisia	23.3	28	10	13
Zimbabwe	25.2	29	-13	-10
Lesotho	25.7	30	-16	-16
Vietnam	26.1	31	-5	—
Nicaragua	26.2	32	-6	-10
Botswana	27.0	33	7	-6
Algeria	27.1	34	17	20
Kenya	27.1	35	-13	-11
Myanmsr	27.5	36	-7	—
El Salvador	27.8	37	4	—
Oman	28.9	38	25	—
Guatemala	29.3	39	8	-12
Papua New Guinea	29.8	40	-1	—
Namibia	30.0	41	11	—
Iraq	30.1	42	3	—
Cameroon	30.9	43	-1	—
Congo	31.5	44	4	—
Ghana	31.8	45	0	—
Egypt	34.0	46	14	16
India	35.9	47	-3	-11
Zambia	36.9	48	-7	-14
Laos, People's Dem. Rep.	39.4	49	2	—
Togo	39.8	50	-4	—
Tanzania, U. Rep, of	39.8	51	-8	14
Cambodia	39.9	52	1	_
Morocco	40.2	53	16	28
Nigeria	40.5	54	2	8

Country	*HPI-1 value (%)*	*HPI-1 rank*	*HPI-1 Rank minus HDI rank*	*HPI-1 rank minus $1-a-day poverty rank*
Central African Rep.	40.7	55	-7	—
Congo, Dem. Rep. of	41.1	56	3	—
Uganda	42.1	57	-10	-2
Sudan	42.5	58	-6	—
Guinea-Bissau	42.9	59	-10	-10
Haiti	44.5	60	-6	—
Bhutan	44.9	61	-2	—
Mauritania	45.9	62	4	8
Pakistan	46.0	63	14	24
Cote d'lvoire	46.4	64	7	20
Bangladesh	46.5	65	9	15
Madagascar	47.7	66	5	-3
Malawi	47.7	67	-1	9
Mozambique	48.5	68	-2	—
Senegal	48.6	69	4	1
Yemen	48.9	70	10	—
Guinea	49.1	71	0	21
Burundi	49.5	72	-1	—
Mali	52.8	73	-1	—
Ethiopia	55.5	74	2	15
Sierra Leone	5S.2	75	-2	—
Burkina Faso	5S.2	76	1	—
Niger	62.1	77	1	3

Notes: (1) HDI and $l-a-day poverty ranks have been recalculated for the universe of 77 countries.

(2) A negative figure indicates that the HPI-1 rank is better than the other, a positive the opposite.

Source: (1) UNDP Human Development Report, 1998

(2) UNO, Population Division, 1998, World Resources : A Guide to the global Environment, 1998-99, Oxford University Press, New York.

HUMAN POVERTY IN INDUSTRIAL COUNTRIES

Poverty and deprivation are not only a problem of developing countries, but also in industrial countries. The following points substantiate this statement:

1. On the basis of an income poverty line of 50 percent of the median personal disposable income, more than 100 million people are income-poor in OECD (Organization of Economic Cooperation and Development) countries.
2. At least 37 million people are without jobs in the industrial countries, often deprived of adequate income and left with a sense of social exclusion from not participating in the life of their communities.
3. Unemployment among youth (15-24 years) has reached staggering heights, with 32 percent of young women and 22 percent of young men in France unemployed, 39 percent and 30 percent in Italy and 49 percent and 36 percent in Spain.
4. About 8 percent of the children in the developed-industrial countries, including half or more of children of single parents in Australia, Canada, U.K, and U.S.A., live the income poverty line of 50 percent of median disposable personal income.
5. Nearly 200 million people are not expected to survive to age 60.
6. More than 100 million are homeless, a shocking high number amid the affluence.
7. Among 17 industrial countries Sweden has the lowest incidence of human poverty, with 6.8 per cent, followed by the Netherlands and Germany. The countries with the most poverty are the U.S. A, with 16.5 percent, followed by Ireland and the U.K. at 15.2 percent and 15 percent.
8. The extent of human poverty has little to do with the average level of income. For example, the U.S.A., with the highest per capita income measured in purchasing power parity (PPP) among the 17 countries, also has the highest human poverty.
9. All the 17 industrial countries have reached high levels of human development.
10. The first and second ranking countries in respect of human development, viz., Canada and France with HDI value of more than 0.900, have significant problems of poverty, and their progress in human development has

been poorly distributed. About 17 percent of Canada's people lack adequate literacy skills, more than the proportion in Sweden.

INCOME DISPARITIES

Disparities in income are quite significant among the different nations and there are also striking intra-national inequalities in income. For example, in 1960, 20 per cent of the world's people, who live in the richest countries, had 30 times the income of the poorest 20 percent by 1995; about 82 timed as such income.

Income distribution in industrial countries also shows wide disparities between rich and poor. In the worst case, Russia, the income share of the richest is 11 times than that of the poorest. In Australia and the U.K., it is nearly 10 times. The U.K. stands out for its particularly sharp rise in income inequality over the 1980s.

The Ultra-Rich

The estimates made by the UNDP and the World Bank show that the world's 225 richest people have a combined wealth of over US$ 1 million, equal to the 2.5 billion world's people.

The enormity of the wealth of the ultra-rich is a mind-boggling contrast with low incomes in the developing world. A few examples, revealing the glaring disparities in the wealth of the ultra-rich and the poor nations, have been cited as under:

1. The three richest people have assets the combined GDP of the 48 least developed countries.
2. The 15 richest have assets that exceed the total GDP of the sub-Saharan Africa.
3. The wealth of 32 richest people exceeds the total GDP of South Asia.
4. The assets of 82 richest people exceed the total GDP of China, the most populous country, with 1·2 billion inhabitants.

Poverty Definition

According to Gillin and Gillin, "Poverty is that condition in which a person either because of inadequate income or unwise expenditure, does not maintain a scale of living high enough to provide for his physical and mental efficiency and to enable and his natural dependents to function usually according to the standards of society of which he is member." Poverty then, is a condition of extremely lower standard of living. As Goddard puts it, "Poverty is insufficient supply of those things which are requisite for an individual to maintain himself and those dependent upon in health

and vigour." Therefore, a man is called poor when he unable to gather the means to keep himself and his family in health. The criterion of poverty differs in different countries. In U.S.A. a person earning Rs.50 a month will be called poor. But in fact a condition the absence of the fulfillment of the minimum necessities of life should be called poverty everywhere. The form of this minimum necessities, however changes according to place and time.

Causes of Poverty :

Social workers point out different causes of poverty. According to Henry George, the main cause of poverty is the personal ownership and the monopoly of the individual on the land. "In the great cities where land is so valuable that it is measured by the foot, you will the extremes of the poverty and of luxury. And this disparity in condition between the two extremes of the social scale may always be measured by the price of the land." (George 1936). To Marx, the main cause is the exploitation of the labourers by the capitalists. In his words, "He creates surplus value which for the capitalist has all the charms of a creation out of nothing." According to Malthus, poverty increases because while the food production increases in arithmetical progression, population increases in geometrical progression. In the words of Landis and Landis, "In a world there economic hazards are so numerous, the individual cannot always blamed for poverty." Hence, besides the personal causes there are geographical, economic and social causes of poverty.

Personal causes:

The important personal causes of poverty are as follows:

(i) *Sickness:* Hunter has written, "Poverty and sickness form a vicious partnership each helping the other to aid the miseries of the most unfortunate of mankind." Due to sickness while a man is unable to walk and his income decreases a major portion of his income is also spent on the cure of the disease,

(ii) *Mental Diseases:* Due to mental diseases a person becomes incapable of doing anything. This decreases his income and increases poverty,

(iii) *Accidents:* Accidents make a person entirely incapable of work or considerably reduces his capacity for it.

(iv) *Illiteracy:* Poverty and illiteracy are mutually related. Illiteracy increases poverty since the capacity to earn of an illiterate person is very low.

(v) *Idleness:* Inspite of sufficient opportunity to work, do not work because of idleness and hence remain poor,

(vi) *Extravagance:* It is well known that an extravagant person can waste any amount in no time. In fact the cause of poverty is not a lower income but excess of expenditure over income,

(vii) *Demoralization:* The lowering of character and morale leads to personal disorganization and finally to poverty,

(viii) *Other personal causes:* Besides the above-mentioned personal causes of poverty there are some other important personal causes. If a man has too many children to bring up, his standard of living is definitely lowered and he becomes relatively poor.

Geographical causes:

Besides the above-mentioned personal causes, the following geographical factors are also responsible for increasing poverty:

(i) *Unfavourable climate and weather:* In the extremely cold climates and weathers the amount of work and production is considerably lowered. This increases poverty.

(ii) *Absence of natural resources:* In the absence of natural resources the inhabitants of the deserts, high mountains and extremely hot and extremely cold countries generally remains poor.

(iii) *Natural calamities:* Natural calamities such as the eruptions of volcanoes, typhoons, floods, earthquakes and lighting cause serious damage to poverty and agriculture. In India the absence of timely rains, excessive or deficient rains cause serious damage to agriculture. This increases poverty everywhere.

(iv) *Pests:* Pests are a major cause of damage to agriculture and movable property such as books, furniture, etc.

Economic causes:

Besides the geographical causes the main causes of poverty are economic of these the important ones are as follows:

(i) Agricultural causes: Absence of sufficient manure, improved tools, implements and machines, means of irrigation and cattle of high breed, exploitation of farmers by the landlords and constant fragmentation of land are some important agricultural causes which increase the poverty among people of the agriculture class.

(ii) *Unequal distribution:* Even if production is sufficient, millions of laborers remain poor in the country where distribution of wealth is unequal.

(iii) *Economic depression:* Economic depression cause decrease in trade and commerce, lockout of mills and factories and unemployment of millions of laborers and traders.

(iv) *Unemployment:* Unemployment is the most serious economic cause of poverty. In India it is a major cause of the lower standards of living of the people both in urban and rural areas.

(v) *Unproductive hoarding:* If a major portion of the wealth of the country is hoarded in unproductive forms such as jewellery, etc, the economic development of the country is seriously handicapped. This is a serious cause of poverty in India.

(vi) *Unwise economic policy:* Sometimes inspite of the presence of sufficient resources and manpower in a country, the people remain poor because of the unwise economic policy of the government.

Social causes:

Beside the above - mentioned economic causes the following social causes also increase poverty:

(i) *faulty educational system:* An important social cause of poverty is faulty educational system. It is because of this that is in India thousands of educated persons are unemployed and leading a life of poverty.

(ii) Faulty and insufficient housing.

(iii) Absence of training in home science.

(iv) Evil customs and traditions.

(v) Insufficient provision of medical aid.

(vi) War: War devastates prospering lands and rich countries. It leads to heavy loss of property and manpower. It upsets the balance of society by disrupting the moral standard and socio- economic system. It gives a serious blow to trade and commerce both national and international. Epidemics spread after war thus adding to the misery of the people. All this lead to poverty.

The above mentioned personal, geographical, economic and social causes do not exhaust all the causes of poverty. In fact, they differ from man to man and society to society. But the above-mentioned are the important causes of poverty everywhere.

Eradication of poverty requires removal of all these causes. This requires efforts from the government as well as from the people.

Poverty in India:

India represents a dichotomy in development. It ranks in nineteenth in worlds industrial production and twelvth in total gross national production (GNP), yet it has a large population that is extremely poor. The United National Human Development Index based on three indicators -life expectancy, educational attainment, and real GDP in purchasing power parity terms-ranks India 134th among 174 countries. In terms of real GDP per capita, it is ranked 141th. Pakistan is 100th and China is 123th (Outlook, February 14, 1996). Although since independence, the country has registered a significant overall growth rate, and there has been a progressive increase in the per capita income- from Rs. 1,630 in 1980-81 to Rs. 3,269 in 1987-88, Rs.4, 974 in 1990-91, Rs.6, 234 in 1993-94 and Rs.16,929 in 1994-95. The per capita income at constant prices (1980-81) was estimated to be Rs. 2,226 in 1992-93, Rs.2, 282 in 1993-94, and Rs.2, 362 in 1994-95, The Hindustan Times, August 22,1995, yet there has been a deterioration in the living standards of a large section of the population.

The 1995 figures (which actually pertain to the year 1987-88) point out that the highest number of persons below the poverty line existed in Orissa(44.7%), followed by Bihar (40.8%), Madhya Pradesh(36.7%), Uttar Pradesh(35.1%), Tamil Nadu (32.8%), Karnataka(32.1 %), Andhra Pradesh (31.7%), Maharashtra(29.2%), West Bengal (27.6%), Rajasthan (26.4%), Assam (22.8%), Gujarat (18.4%), Kerala (17.0%), Jammu and Kashmir (13.9%), Haryana (11.6%), Himachal Pradesh (9.2%), Punjab (7.2%) and small states and UTs (7.7%) (The Hindustan Times, May 9, 1995) of about 320 million poor persons in India (according to now estimates of the Planning Commission), the absolute destitutes - which are the bottom 10 percent of the society are around 50-60 million. These are the old, the sick, and the disabled people, for whom it is not employment and the opportunity of earning of income that has to be provided, but some kind of social security, involving regular monthly payment. This leaves some 260 million (according to official figures) to 350 million (according to economists) people living at various levels of poverty for whom employment opportunities have to be provided. In the rural areas, these poor are the landless agricultural laborers, casual non-agricultural laborers, the marginal farmers, and the displaced village artisans such as the blacksmiths, the carpenters and the learner workers, while in the urban areas, these poor are the non- unionized industrial workers, vegetable, fruits and flower vendors, servants in tea shop domestic servants and daily wages earners.

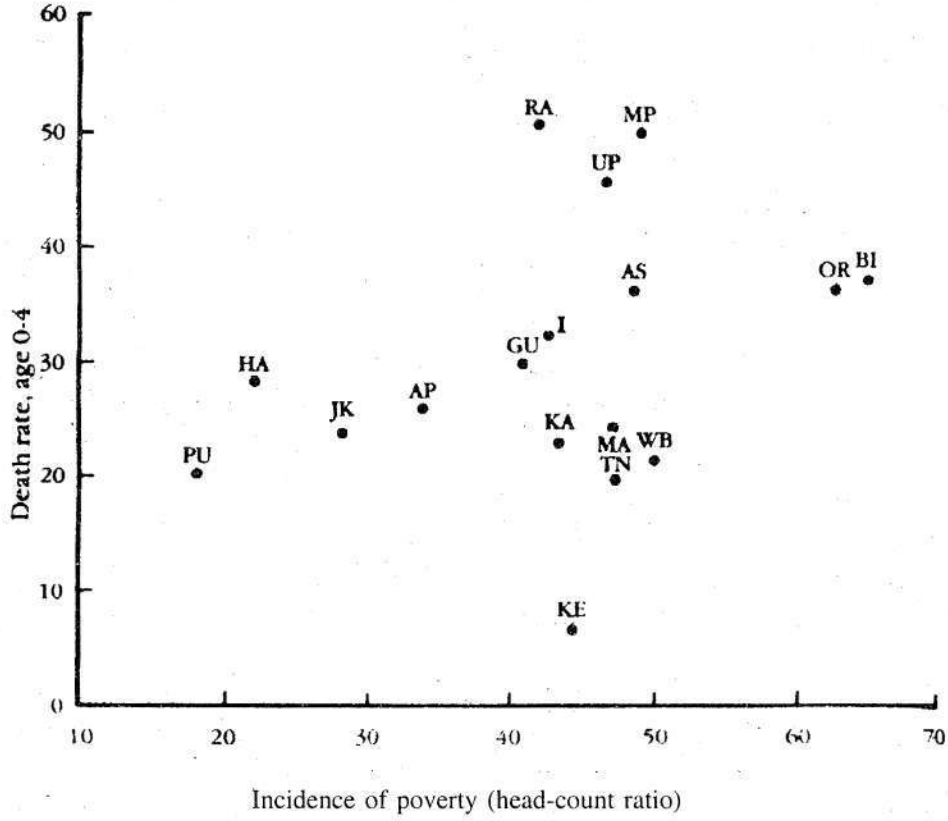


FIG. ***Indian States : Poverty and Cbild Mortality, 1987 – 8***

Source Minhas et al. (1991); *Sample Regustration System 1988, Statement*

I = India	
AP = Andhra Pradesh	AS = Assam
BI = Bihar	HA = Haryana
GI = Gujarat	JK = Jammu & Kashmir
KA = Karnataka	KE = Kerala
MA = Maharashtra	MP = Madhya Pradesh
OR = Orissa	PU = Punjab
RA = Rajasthan	TN = Tamil Nadu
UP = Uttar Pradesh	WB = West Bengal

Despite the slowdown in economic growth over the past few years, the number of people in the upper, upper middle, and middle income segments has been decreasing according to the surveys by the National Council of Economic Research (NCAER).

National income is a comprehensive index of the state of an economy and measure of its growth over time. The figures of national income in India available for the last four decades do record some rise. National income in 1950-51 increased by 1.47 percent in 1980-88, and by 5.1 percent in 1995-96. But the increase in the growth rate in comparison to other developing countries is very low. When the annual growth rate of per capita GNP of India between 1984-91 was 2.3 percent, it was 6.5 percent in the case of China, 12.4 per cent in the case of Japan, and 13.8 percent in the case of Korea (India Today, November 15, 1994:159).

Disparity in the rural and urban per capita incomes is also glaring (it being one for rural to 2.4 for urban areas). The income distribution in rural and urban areas in 1983 shows that 11 percent families in the urban areas and 3 percent families in the rural areas belonged to the 'upper class' (with an income of more than Rs.3,000 per year at the 1970-71 price level).

About 74 percent of India's population lives in villages. The incidence of poverty is much higher in villages- roughly 39 percent of the rural population. Agriculture is a source of livelihood for 70 percent of the population but agriculture accounts for less than 40 percent of the national income. One of the reasons for this is the unequal distribution of land. 10 to 20 percent of landholders hold 70 per cent of the total land and 50 percent of landholders are marginal farmers with less than one hectare (2.471 acres) of the land.

According to the Integrated Rural Development Programme (IRDP) definition, approved by the Ministry of Rural Development, as revised in May 1991, a rural household with an annual income of less than Rs.11,000 is described as a poor household. These 'poor-households' have been further classified into four groups: the destitutes (with an income of less than Rs.4,000 per annum at 1991-92 price level), extremely poor (with an income between Rs.4, 001 and Rs.6, 000 per annum), very poor (with an income between Rs.6,00 land Rs.8,500 per annum), and poor (with income between Rs.8, 501 and Rs. 11.000 per annum).

A staggering 55 percent of the rural population of the country still live in Kutcha houses. Further, in most backward states (like West Bengal, Bihar, Orissa, Uttar Pradesh, and Madhya Pradesh), 15 to 19 percent rural homes electricity,9 to 11 percent have pipe water and 11 to 16 percent have access to public distribution system.

Steps taken to check poverty

(i) *20- Point programme:* Indira Gandhi propounded this programme in July, 1975 for reducing poverty and economic exploitation, and for the upliftment of the weaker section of the society. The five important goals of this programme were: (a) controlling inflation, (b) giving incentive production, (c) welfare of the rural population, (d) lending help to the urban middle classes, and (e) controlling economic and social crimes.

(ii) *State poverty Alleviation Programmes:* Several poverty alleviation progremmes have been launched by the government for the rural poor, comprising the small and marginal farmers, landless labourers and rural artisans supportive land- based activities like irrigation, animal husbandry, etc, TRYSEM (Training Rural Youth Skills for Self- Employment), Jawahar Rozgar Yojna (generates additional gainful employment for the rural un-employed, and underemployed, and provides employment for 50 to 100 days in a year to at least one member in poor family, NREP (wage employment in slack season), RLEGP (80 to 100) days of wage employment to every landless household), DPAP (area development of droughtprone areas), and DDP (area development of hot and cold deserts). We will discuss each of these progremmes separately.

(iii) *IRDP:* The integrated Rural Development Programme (IRDP) is a major instrument of the government to alleviate poverty. Its objective is to enable selected families to cross the poverty line by taking up self employment ventures in a variety of activities like agriculture, horticulture and animal husbandry in the primary sector; weaving and handicraft in the secondary sector; and service and business activities in the tertiary sector.

(IV) TRYSEM: The scheme of training rural Youth for self employment was started on Aug 15, 1979 to provide technical skill to the rural youth in the age group of 18-35, and belonging to families below the poverty line.

(V) NREP: The National Rural Employment Programme (NREP) was planned for creating additional employment opportunities in the rural areas with the help of surplus foodgrain.

(VI) RLEGP: The Rural Landless Employment Guarantee Programme (RLEGP) aimed at providing supplemental employment to the poor on public works at a very low wage of Rs. 3 per day revenue, sales tax, motor vehicles tax, irrigated holdings, and on professionals. The amounts so collected, with

matching contributions from the state government, were credited to an EGS fund for taking up employment works. This programme to has now been merged (along with NREP) into the JRY.

(VII) Jawahar Rozgar Yojna: Under the scheme, it is expected that at least one member of each poor family would be provided with employment for 50 to 100 days in a year at a work place near his or her residence. About 30% of the jobs under this scheme are reserved for women. Both the rural wage employment programmes in (i,e. the REP,and the RLEGP) were merged in this scheme. Central assistance to the scheme is 80%. The scheme is implemented through the village panchayats. The central government claims that 3121.33 million mandays of employment were generated in various states between 1992 to 1993 and 1995 to 1996 under this JRY at an outlay of Rs 13,248 crore (Rajasthan Patrika, June 16, 1966). The scheme covers 46% of the population.

(VIII) Antyodaya Programme: 'Antyodaya' means development (Udaya) of the people at the bottom level (ant), that is, the poorest of the poor. The idea was to select five of the poorest families from each village (out of 27,000 inhabited villages) every year and to help them in there economic betterment

(IX) Garibi Hatao and Bekari Hatao Programme: The Garibi Hatao slogan was given by Indira Gandhi in March 1971 at the time of National election while the Bekari Hatao slogan was given by the All India Congress Committee (AICC) at its annual session in April 1988.

Poverty and Famine in Ethiopia:

Ethiopia is located in the eastern Africa, this country extends from the east cost to the Abyssiman Highland. Inspite of the proximity of the equator the central part of the country, i.e. Abyssiman Highland enjoy equable climate due to its Altitude. Average July temperatures are above 30° c except in the said Highland (200° c). The rainfall varies from less than 25 cm (coastal East) to 50cm in the interior. More over, this rainfall is erratic and sometimes drought condition prevails for 5 or 6 consecutive years. Wheat and maize are the estable crops of the region. Sometimes, the standing crops with in due to poverty of rainfall and a famine condition prevail there. Famines occur at regular intervals so that males high rates from villages to towns leaving their families in the villages forever. Due to proper care of the land, agriculture suffers. It is at this background that we will discuss poverty and famine of Ethiopia.

Ethiopia least developed countries in the Worlds 210th in terms of GNP per capita terms. Measured by per capita GDP, Human Development Index, help status as well as other Macro Economic indicators show that the level of poverty is execute. Its per capita income, although varies slightly from one source to another, is one of the lowest in the world, only about $100 per annum.

According to the house hold income -expenditure survey, almost half of the country's population can hardly afford the minimum basic food requirements. According to various sources, it has been estimated that about 54% of the population lives under a $2, and 46% of the population of Ethiopia lived under a 2$ a day. Two small land holdings, poor agricultural practices, lack of portable water, and other factors contribute to a vicious cycle of deteriorating health and environments - and to increasing poverty. Agriculture is still the mainstay of the economy accounting for about 50% of GDP, 85% of the labour force and 90% of export earnings. The industrial sectors, an average contributes only 10 to 12% of GDP. The service sector grew moderately with large variations in the performance of the sub- sector. During the period of the Marxist regime the share of Agriculture was 53% in GDP which is now 51%. The highest rate of growth in Agriculture during the Marxist regime under consideration was achieved during the drought year of 1984 to 1985 when it decline by 21%. The average growth rate in Agriculture during the last ten years of the Marxist regime was a mere 2% which is significantly lower than the rate growth of population. Despite massive efforts by the present EPRDF govt. to improve the sectors performance, agricultural production did not show a significant improvement over the Marxist regime.

Industrial sector's contribution to the country's GDP on the average between 1980 to 1981 was 12.2% and it remained static over the period 1992/93 to 2004-05 with average 10.6% of GDP.

Trade structure of Ethiopia:

The tragedy of the Ethiopian economy of the past half century is revealed in its trade structure.

The country continuous to export the same primary commodities, dominated by coffee and imports manufactured goods as it did half a century ago, a conspicuous revelation of the absence of structure transformation. The consequence of the absence of structure transformation is that the capacity of exports is declining, leading to higher debt levels. While imports as percent of GDP have been increasing at a faster rate, exports have failed to match the increasing in imports, resulting in a widening gap between the two.

Dependence on foreign aid:

The structure and performance of the Ethiopian economic has made the country to be increasingly dependent on foreign aid during the last four decades. This poor performance of the economic adversely affected the mobilization in International financial resources and low capacity of foreign exchange earning coupled with the growing resources requirements for the implementation of development project. Thus foreign aid has been a prominent and enduring feature of the Ethiopian economy.

Aid flows to Ethiopian has fallen from $1089 million in 1993 to $668 million in 1998. In others words; aid as % of central government expenditure fell from 9.2% to 5.3% in 1998.

An Assessment of Rural Poverty

It has been estimated that of the 6.9 million people living in urban areas, about 4 million (58 percent) live below the poverty line; half of these people are desperately poor. An assessment of rural poverty was based on estimates of farmers' assets (farm area, the number of oxen per farm), their location, and their vulnerability to poverty. On this basis, it was estimated that 30% of farm households are chronically poor. Assuming a household size of five, this amounts to about 12.6 million rural people. If those who are vulnerable to poverty (17%) are added, then there are an additional 7.4 million, giving a total of about 20 million rural poor.

The increase in calorie in take in rural areas is not inconsistent with the level of real per capita spending on consumption.

(i) Rural people spend more on food than on non-food items. In fact a considerable proportion of total consumption is accounted for by one's own production.

(ii) The survey results indicate that the food share in rural area has increased from 60%in 1995/96 to 67% in 2004/05. While on the other hand, food share in urban areas declined from 56% to 53% during the same period.

(iii) It must also be underlined that an increase in the calorie content of the consumption basket doesn't necessarily indicate an increase in food quality.

CHILD LABOUR: Girls and boys are significantly engaged in income earning and domestic work. In Delanta boys and girls collect firewood on steep ravines to sell 15km away. In Addis Ababa and Metta, children are engaged in street hawking and petty trading, girls alongside their mothers; this is a main reason for boys from the

poorest families to stop attending school. Children in urban areas become vagrants: 'Our *children sometimes beg or steal money for food'*. (Mothers, Addis Ababa). Girls in Addis Ababa and Delanta Dawunt worked in the sex trade and in bars.

We have used the main indicators of poverty at consumption levels. Ethiopia, the major barriers to development and the mam indicators of poverty include the following:

- the low status and under-representation of women;
- the fact that coping strategies have become main sources of livelihoods;
- the low educational status of adults and children;
- the increased burden of labour on women and children, who must work to earn income for daily food;
- widespread indicators of malnutrition and high mortality rates among infants and children;
- miscarriage and anemia among pregnant girls and women, and high maternal mortality rates;
- widespread dependence on traditional structures and practices for governance, healing, and childbirth;
- the persistence of harmful traditional practices such as Female Genital Mutilation (FGM);
- only 45% of households consume the World Health Organization's minimum standard of 2200 kilocalories of food per adult per day;
- 42% of the children under 5 years of age are underweight;
- 75% of poor families share their sleeping quarters with livestock overnight; and
- 40% of children sleep on the floor.

CONCLUSION: (Measures taken by the government).

The Economic Reform Programme : The economic reform programme introduced by the Ethiopia Government in October 1992,the key features of the policy reform are a shift to a market economy, agricultural-development-led industrialization (ADLI) as the long-term development strategy, and the adoption of macro-economic stabilization and structural adjustment programme. The main elements of the macro-economic stabilization and structural adjustment programme in Ethiopia are the following :

- tax-regime, mainly by broadening the tax base and reducing income taxes and taxes on foreign trade:
- controlling and prioritising government expenditure in favour of social and economic infrastructure;
- restructuring public enterprises for management autonomy and eventually privatizing;
- liberalising the factor and product markets and removing subsidies, so that resource allocation is led by market forces;
- devaluing the exchange rate and determining it by open auction;
- changing the investment climate to encourage private investment;
- Liberalising the interest rate.

The EPRDF is an unpopular minority govt. Student and youth of Ethiopia particularly Students of Addis Ababa University, have agitated against the EPRDF's policy. In May, 2005, almost 48 peoples have died and hundreds injured during an agitation against the EPRDF govt. But there are no any left parties or groups. Without democratic institutions and organisation, mass movements can not buildup. It will be necessary to strengthen the workers, peasants, youth, students, and women's movement against the corrupt and anti-people EPRDF govt. that running as supported by America.

CHINA

Location : Eastern Asia, bordeing the East China sea, Korea Bay, Yellow sea and South China sea, between North Korea and Vietnam.

Area : Total 9,596,960 sq.km.

Terrain : The terrain of China consists mostly of mountains and high plateaus. There are deserts in the West and Plains, deltas and hills in the east.

Natural Resources : Coal, iron ore, petroleum, natural gas, mercury, tin, tungsten, antimony, maganese, molybdenom, vanadium, magnetite, aluminium, lead, zinc, uranium, hydropower potential.

Climate : The vast expanse of China means that the country climate is extremely diverse. China has a tropical climate in south but is subarctic in the north.

PEOPLE

Population : 1,313,973,713 (July, 2006 est.)

Population Growth rate : 0.59% (2006 est.)

Sex ratio : 1,06 male (s) / female (2006 est.)

Literacy rate : Total 90.9% Male 95.1% Female 86.5% (2002 est.)

Infant Mortality rate : 2323.12 deaths / 1,000 live births (2006 est.)

Life expectancy : Total 72.58 years, Male 70.89 years, Female 74.46 years (2006 est.)

ECONOMY

China is a essentially an agricultural country. The main crops are rice, tea, tobacco, sugarcane, jute, soya, ground nut and memp. The main forest products are teak and ting oil. Among the principle industries are cotton and woollen mius, iron, leather and electrical equipments. The chief minerals are coal, manganese, iron ore, gold, copper, lead, zinc, silver, tungsten, mercury, antimony and tin. Petroleum industry is steadily growing.

Measured on a purchasing power parity (PPP) basis, China in 2005 stood as the second largest economy in the world after the US, although in per capita terms the country is still lower middle income and 150 millions Chinese fall below international poverty lines. Economic development has generally been more rapid in costal provinces than in the interior and there are large disparities in per capita incomes between regions. The Government has struggle to (a) sustain adequate job growth for tens of millions of workers laid off from state-owned enterprises, migrants and new entrans to the work force; (b) reduce corruption and others economic crimes, and (c) contain environmental damage and social strike related to the economy's rapid transformation. Between 100 to 150 million surplus rural workers and adrift between the villages and the cities many subsisting an part time, low-paying jobs. One demographic consequence of the 'one-child policy' is that China is now one of the most rapidly aging countries in the world. Another long-term threat to growth is the deterioration in the environment, notably in pollution, soil erosion, and the steady fall of the water table especially in the North China countries to lose arable land because of erosion and economic development.

POVERTY

This Country Assistance Strategy (CAS) for China is the first since it ceased borrowing on concessional terms from the International Development Association(IDA), and the country is now in a very different context from that of the previous 1997C AS. In particular, this CAS coincides with a shift in China's reforms: from the liberalization phase , to the more difficult structural, and institution building

phase a dynamic growth in the private sector and a continuing need , though reduced, for availability of concessional external financing. Since 1997, China has managed macro economic conditions well, with a sustained growth, but the medium-term financial position needs to be strengthened .Moreover, the pace of policy, and institutional reform accelerated in the mind-1990s, magnifying difficulties while improving longer-term prospects, and yet, despite substantial progress on poverty reduction over the last decade, poverty remains a predominantly rural issue, although urban poverty is a growing concern. The Bank's assistance strategy is designed to help China : (a) improve the business environment, and help accelerate the transition to a market economy, mostly through an array of knowledge transfer activites b) address the needs of the poorer, disadvantaged people, and lagging regions, through investment lending in rural development, infrastructure, and social sectors and, c) facilitate an environmentally sustainable development process through investment lending in natural resource management , watershed rehabilitation , and wastewater treatment, in addition to energy , and global environment projects, The International Finance Corporation's strategic priorities for this CAS period include: targeted technical assistance to improve financial markets, private participation in infrastructure, and small and medium scale enterprises, which includes capacity building , and support to private banking, and financial institutions (Source :World Bank ReporJ:2004).

PAKISTAN

GEOGRAPHY

Location : Pakistan lies in Southern Asia, bordering the Arabian sea, between India on the east, Iran and Afganistan on the west.

Area : 803,940 sq.km.

Terrain : The flat Indus lies in the east. There are mountains in the north and north-west while the Baluchistan plateau lies in the west.

Natural resources : Land, extensive natural gas reserves, limited petroleum, poor quality coal, iron ore, copper, salt, lime stone.

Climate : Hot, dry desert type of climate in most parts of the temperate type in north-west.

PEOPLE

Population : 165,803,560 (July, 2006 est.)

Population growth rate : 2.09% (2006 est.)

Sex ratio : 1.05 male(s) / female (2006 est.)

Literacy rate : Total 48.7%, male 61.7%, Female 35.2% (2004 est)

Infant mortality rate : 70.45 deaths / 1,000 live births (2006 est)

Life expectancy : Total 63.39 years, Male 62.4 years, Female 64.44 years (2006est.)

ECONOMY

Agriculture (including forestry and fishing) is the mainstay of Pakistan's economy, employing about 50% of the working population and providing about 26% of the country's gross domestic product (GDP).

The entire area in the and west is covered by great mountain ranges. The rest of the country consists of fertile plain watered by five big rivers and their tributaries. Agriculture is dependent almost entirely on the irrigation system based on these rivers. The main crops are wheat, cotton, maize, sugercane and rice, while the delta and kalat divisions (Baluchinstan) are known for their fruits and dates.

Pakistan is self-sufficient in wheat, rice and sugar.

Industries employs about 10% of the population manufacturing (refined sugar, vegetable product, jute textiles, soda ash, sulphuric acid, caustic soda, clip board and paper board, bycicles, cotton cloth, cotton yearn cement and steel) contributes about 20% to GNP. Main exports are cotton cloth, cotton yearn, rice, leather carpets and tapestries. There are international airports at Karachi, Islamabad, Lahore, Peshawar and Quetta.

Poverty in Pakistan : Poverty is multidimensional. One key dimension is consumption poverty extent to which actual levels of private consumption of household or individuals fall below a poverty line that society believes represents a minimum acceptable standard of private consumption .This report World Bank,2002 finds that the incidence of consumption poverty decline by 12 percent in six years in Pakistan. Poverty,however, encompasses other dimension , such as early mortality high rate of disease, and illiteracy, which relate to the extent to which the population has a generally good record on growth and economic policy , it has been progressing very slowly in these areas. A new consensus has emerged in recent years that Pakistan must step up its human development, since it is in itself a key objective to a country's development. The analysis of the reports indicates that Pakistan needs to improve its public education, health and family planning services. The centerpiece of Pakistan's human development strategy is the Social Action Programme. The report shows that considerable progress has been achieved under the programme, but the achievements are fragile and are not yet fully institutionalized. In addition strategy should consist of three other components :l)deepen the process of economic stabilization and adjust-

ment started in the late 1970s 2)complement the general economic reforms in the stabilization and adjustment programme with a set of sectoral reforms, especially in agriculture and 3) strengthen the social safety net.

Table A-1 : Economic and Social Indicators in India and Selected Asian Countries

	India	*Bangladesh*	*Nepal*	*Pakistan*	*Sri Lanka*	*China*	*South Korea*	*Indonesia*	*Thailand*
POPULATION, mid-1992 (millions)	883.6	114.4	19.9	119.3	12.4	1162.2	43.7	184.3	58.0
PER-CAPITA INCOME AND RELATED INDICATORS									
GNP per capita, 1992 (US$)	310	220	170	420	540	470	6,790	670	1840
PPP estimates of GNP per capita, 1992 (1992 international dollars)	1210	1230	1100	2130	2810	1910	8950	2970	5890
PPP estimates of GNP per capita, 1992 (USA = 100)	5.2	5.3	4.8	9.2	12.2	9.1	38.7	12.8	25.5
Average annual growth rate of per-capita GNP, 1980-92 (%)	3.1	1.8	2	3.1	2.6	7.6	8.5	4	6
LONGEVITY, MORTALITY AND FERTILITY									
Life expectancy at birth, 1992[b] (years)									
Female	59	56	53	59	74	71	75	62	72
Male	59	55	54	59	70	68	67	59	67
Persons	59	55	54	59	72	69	71	60	69
Crude death rate, 1992 (per 1,000)	10	11	13	10	6	8	6	10	6
Infant mortality rate, 1992 (per 1,000 live births)	79	91	99[a]	95	18	31	13	66	26
Proportion of low-birthweight babies, 1990 (%)	33	50	n/a	25	25	9	9	14	13
Crude birth rate, 1992 (per 1,000)	29	31	38	40	21	19	16	25	20
Total fertility rate, 1992	3.7	4.0	5.5[a]	5.6	2.5	2.0	1.8	2.9	2.2[a]
LITERACY AND EDUCATION									
Adult literacy rate (age 15+)[c], 1992 (%)									
Female	39	23	14	22	85	68	95	77	92
Male	64	49	39	49	94	87	99	91	96
Persons	52	37	27	36	89	78	97	84	94

Mean years of schooling (age 25+), 1992	2.4	2	2.1	1.9	7.2	5	9.3	4.1	3.9
Proportion of first-grade entrants who complete the primary cycle of school education (%)	62	47	n/a	48	97	85	99	77	87
OTHER GENDER-RELATED INDICATORS									
Female-male ratio (ratio of females to males in the population), 1992 (%)	93	94	95	92	99	94	100	101	99
Female share of the labour force, 1990-2 (%)	29	41	34	14	33	43	40	40	47
SAVINGS, INVESTMENT AND TRADE									
Gross domestic savings as proportion of GDP, 1992[d] (%)	22	6	12	14	15	43	37	37	35
Gross domestic investment as Proportion of GDP, 1992[d] (%)	23	12	22	21	23	39	37	35	40
Exports of goods and non-factor services as proportion of GDP, 1992[d] (%)	10	10	19	12	32	18	32	29	36
Average annual growth rate of exports, 1980-92 (%)	5.9	7.6	9.7	11.1	6.5	11.9	11.9	5.6	14.7
Net present value of total external debt as proportion of GNP, 1992 (%)	26	29	29	37	41	13	14	62	35
Total debt sdervice as proportion of exports, 1992 (%)	25	17	12	24	14	10	7	32	14

Notes : [a] Subject to more than the usual margin or error. [b] 1991 for India, 1990 for China. [c] Age 7+, in the case of India (see Explanatory Note), [d] 1990 for China and South Korea.

Source : Dreze, Jean and Amartya Sen, 1996, **India : Economic Development and Social Opportunity,** Oxford University Press.

2.4 GENDER DISCRIMINATION

The word gender was for the fist time used by Oakley in 1971 to refer difference between men and women. Like class, race ethnicity gender is also an important dimension of social stratification in developing societies. Thus, gender became a source of inequality in society. Traditionally women were expected to take up biologically assigned functions only while men assumed social, economic, political roles. Thus, inequalities were constructed within the society and became part of

socio-cultural, religious norms and produced through soci-cultural, religious, political and economic factors. Empowerment of women is a conscious effort towards equiable distribution of power, status and control over resources between men and women. Rowlands points out that empowerment is a process towards increased power or women in social, economic and political realm. (Mohinder Singh "When Home is Hall", The Sunday Tribune, Jan. 14, 2005) Thus, empowerment ot women is an attempt to minimize gender disparity and ensure gender equity.

Gender discrimination : Women empowerment, A Perspective

Bhat rightly utters

I am the woman who holds up the sky
The rainbow runs through my eyes
The sun makes a path through my womb
My thoughts are in the shape of clouds
But my words are yet to come.

(J. N. Bhat, "Gender Equality : Turmoil or Triumph", AIR Journal, Vol. 16, 1998)

It is sad, distressing and unfortunate that between the two.one who is creative,positively constructive and highly beautiful is called weaker, inferior and the the second sex; is sexually harassed, victimized and traumatized; is subject to discrimination, violence, exploitation, oppression and injustice; and is treated as a commodity for sale and purchase. She is marginalized. Perhaps the biggest irony of the world is that the girl child is not safest place, i.e. in her she is killed by sheer neglect. The most inhuman is the trade of prostitution where a female is trapped, branded, mutilated, tortured and moulded to be shaped to suit the lust of sex exploiters; and the most heinous crime is rape which according to susan brown Miller is a conscious process of intimidation by which men keep women in a state of fear.

Gender disparity in South Asia

The Souh Asian region providing home to 1326 million world population one of the poorest region is well having 515 million people below poverty line. The region is characterized by high population growth rate, high level of illiteracy, poor health attainments, poverty, low growth rate, and inequiable distribution of income and resources.6 These countries of the region. Most of the countries of south Asia lack a balance between economic and social development policies. Hence, the integration of the two has not been possible. The south Asin region provide home to 21 percent of world's female population. On the other hand 44 percent of the world's

illiterate women lives in South Asian region (Table). The South Asian women is characterized by:

1. Low literacy rate;
2. Poor access to health and related services;
3. Denial or poor basic human rights;
4. Social and religion-based discrimination against women;

Table : Illiteracy in South Asian Countries

	Percentage of Illiterate	
	Female	Male
Bangladesh	74	70
Bhutan	51	42
India	62	35
Maldives	4	4
Nepal	81	76
Pakistan	47	46
Sri Lanka	76	46
South Asia	62.8	35.9

(After **Human Development in South Asia, 2000,** The Gender Question, Oxford, Karachi).

5. Lowest per capita women's CDP at U.S. $874;
6. Invisibility of women in economy; and
7. Discrimination in legal and governmental sectors.

Dimensions of Disparity

The gender disparity has many dimensions and manifestation in South Asia. Some of them may be discussed here briefly.

1. Forms of Social Identity and structures

Socially, women have been denied equiable treatment constructed by various forms of social identity and social structure in South Asia, The socially constructed disparities may be underlined as follows :

1. Family has been considered highest priority of women and they were expected to remain confined to that.
2. The concept of purdah particularly in Islam, forged gender relationship within society and contained mobility of women.
3. The role of women was valued in terms of:

   (I) Provider of labour useful for property acquisition.

   (II) produce of children especially sons and

   (III) source of a divine energy

(Michael Allen *et at* (eds) 1990 : **Women in India and Nepal,** Sterling, New Delhi).

4. The notion of relative purity particularly during menstruation and childbirth created social hierarchies and had an unfortunation impact on the lives of women particularly in India and Nepal.
5. The notions of widowhood, Sati, trafficking of women resulted in lower status and miserable conditions of women.
6. In India and Nepal the traditional concept of Devadasi degraded the status and role of women
7. Family laws in various countries of the region does not allow gender equality.
8. Except among some communities in Bhutan and South India where matrilinearlity fostered equal itarianism to some extent, Patriarchy has dominated the South Asian societies .Patriarchy is a system through which women are kept subordinate .It signifies a male dominated society . The subordinate of women in patriarchally dominated socieries in South Asia has been defined in terms of child marriage, polygyny and polyandry, denial of share in parental property, dissolution of marriage, guardianship, dowry and violence against women.

(Bhasien, K., 1993 : **What is Patriarchally?** New Delhi)

It may be said here that in South Asia women are subordinated within a highly hierarchical system of gender relations.

2. Economic Inequalities:

The gender-related inqualities can be observed in the economic sector as well some points may be raised here on the basis of that :

1. Women contribute significantly to agriculture labour in all the South Asian countries. In Nepal, India and Pakistan it is the highest.
2. Most of he economically active women work in the informal sector.
3. Women are generally involved in lower jobs.
4. Their ways differen between urban educated women and rural women on the one hand and between men and women in the informal sectors.
5. Women employment rate is lower in comparison to men.
6. Women do not have control over means of production, landownership and income earned
7. Women have lower level of security in jobs.
8. In many cases men in the family do not work or do not share their income to fulfil familiar needs. It, therefore, becomes burden for women.

TABLE : Female Labour (1997)

	(Percent of total)
India	32
Pakistan	27
Bangladesh	42
Nepal	40
Sri Lanka	36
Bhutan(1994)	32
Maldivers(1994)	32

(Source: World Bank UNDP 1999 and 1994)

9. Women workers are subject to harassment at the workplace.
10. Many studies have shown that women labour is subject to discrimination in many ways.

3 Dispartities in Development:

There are vast gender disparities in terms of seeking benefits of modernization and development. While all the South Asian countries have initiated process of modernization and development its benefits have not percolated down to women at par with men. In terms of education there are serious difference . It many be noted

here that education is the key to breaking the geneder bias and empowerment of women . However, despite significant achievents over the years.there are gaps in the educational attainments of men and women.

1. More than half of South Asian adult literates in South Asia are women.
2. Two -third South Asian out of primary school children are girls.
3. Two-fifths of girl students drop out before fifth standard.

(Human Development Report in South Asia, 2000)

4. The gender gap increases in higher educational and technical education. In terms of educational attainments of women situation is highly satisfactory in Maldivers and Sri Lanka, but it is worst in Nepal, Bhutan and Pakistan.

The gender disparities and discrimination in the areas of health, nutrition and nourishment can be observed in following areas:

1. Women face birth related complications in terms of early marriage , more children, pregnancy damages and abortion.
2. Women suffer much in comparison to men in terms of energy deficiency, chronic deseases, etc.
3. Higher mortality rate is among women.
4. Inequitable feeding practies for boys and girls, except in Sri Lanka and Maldives.
5. Strong preference for son which is indeed an alteration of patriarchal society has resulted in female foeticide.
6. Female infanticide takes place in some countries. It was an accepted practice in some of the tribal communities of South Asia.

(Kapur, Pramila, 1993, **Girl child and Family Violence,** New Delhi)

7. Female chidren are more prone to communicable diseases.
8. Women face maternal mortality risk. Maternal mortality cases are high in Nepal, Bangladesh and Pakistan.
9. Lack of Pre- and post -natal care leading to maternal morbidity is high particularly in Bangladesh and India.

4 Discriminatory Laws

The South Asia women ,to a large ,face unequal access to property protection decision -making and justice.

In all the South Asian countries women are subject level to gender specific violence which includes physical violence, sexual,psychological and emotional abuses of various types. Domestic violence to women in term of burning, harassment,tortures,beatings, etc. none of the South Asian countries has specific legislation related to domestic violence. There are countries like Nepal which does not have adequate domestic violence provisions in its panel code.

5 Gender Disparities in Governance

Equal access to men and women at various level and sectors of governance is an indication of balanced development of a society. However, in South Asian countries vast disparities can be observed in this sector as well. If we take the whole region into consideration it may be noted that the women occupy 7 percent of parliamentary seat, 9 percent of the women are in the administration. However, the Involvement of women in local bodies seems to be slightly better as it is 20 percent. There are vast differences relating to female representation in administrative and managerial positions, professional and technical services: women representation in administrative in parliament, cabinet, women in judiciary civil services, various decision-making bodies etc, in all the countries of the region.

Gender disparity in Ethiopia

The National policy on Ethiopian Women (1993) and the national Population Policy of Ethiopia (1993) throws light on the low status of the women. Women are ill under represented in local government, on school commities, and in traditional governing institutions. Their reproductive health status gives cause of extreme concern. They experience early marriage and early pregnancy, high fertility rates, and life - threatening abortions. They receive almost no medical attention throughout their, reproductive cycle. In all rural sites, men dominate women and their children suffer more from poverty and hunger, but the women and girls are to carry heavy burdens regularly. Before the drought, women in all sites were better off. But after devastating drought in early 1990s, households food security had diminished to unsustainable levels, and the dependence on women's low - income petty trading had increased.

'Worst-off' households are those with a family of 10 or more, or with at least three small children. These households cannot feed, clothe, or wash their children, nor send their all children to school or treat them effectively when they are sick.

There are households where the husband has died, or which have no reliable (male) employment and survive on intermittent daily labour (by men) or on the proceeds of women's trading.

About 30 per cent of households were headed by women in Addis Ababa, Delanta Dawunt, and Jijiga; they ranked among the poorest of all. Worst-off households have no livestock and have no land at all, where either or both adults are too weak to work, children contribute their labour to domestic, agriculrural and incoming tasks.

Given these realities, no doubt, women will be certainly empowered and in India more Mother Teresas, Indira Gandhi, Kalpana Chawla, Lata and P.T. Usha-s will emerge and every woman will be assertive and have the similar feelings which have been expressed by Madhu Kishwar in the following poen:

I too have given Agnipariksha
Not One but many
Everyday, a new one
However, this Agnipariksha
Is not to prove myself of this or that Ram
But to make myself
Worthy of freedom
Everyday your envious, dirty looks
Reduced me to ashes
And everyday, like a phoenix I arose again
Out of my own ashes....
Who is Ram io reject me ?
I have rejected that entry society
Which has converted
Homes into prisons

(Madhu Kishwar, 1999 :*Off the Beaten Track : Rethinking Gender Justice for Indian Women,* Oxford, New Delhi)

2.5 POPULATION POLICIES

Population policy means, measures and programmes designed to contribute to the achievement of economic, social,demographic, political and other collective goals,through affecting critical demographic variables, namely the size and growth of population, its geographic distribution (national and international) and its demographic characteristics.lt also includes measures and programmes likely to affect critical demogrtaphic variables as well as those specifically designed to do so. In

defining population policy Berelson has outlined the following three principal characteristics:

1. It includes the active taken by government in the form of a statement of position, laws,decrees or administrative programmes.
2. It covers population events.
3. It refers to both the intentions and consequences designed to alter population events.

Policies regarding Components of Population changes

Thus population policy is characterized by the three components of population change ,viz., fertility mortality and migration. Thus population policy of a country refers to the governmental measures with reference to population change.It decides the goals to be achieved in the fields of fertility, mortality and migration. This may be to understood in more details as follows:

1. Policies influencing Mortality.

Mortality is an undesirable characteristic of population.Therefore population policies aim at reduction of mortality .This has been done particularly through the concept of public health and the national programmes of eradication of 'mass killers', the epidemics Small pox, Malaria,Cholera,etc.The World Health Organisation has defined health as, "A state of complete physical ,mental and social wellbeing and not merely the absence of disease or immunity" This definition of health has decided the goal of public health in different countries.The public health campaigns have led to unprecedented decline in mortality.lt has been pointed out by a United Nations Public Health report that not a single pandemic has occurred since 1918 when influence caused 25 million deaths in the world. According to the United Nations Secretariat," As might be expected all Governments have formulated polices designed to reduce morbidity and mortality, and none has considered acceptable a policy of permitting survival rates to remain low in order to prevent further increase in rates of National Population Growth." In 1974 the United National World Population Conference in Bucharest adopted checking of mortality level as the goal of World Population Plan of Action.It was resolved that, "Countries with the highest mortality levels should aim, by 1985, to have expectation of life at birth of at least 50 years and an infant mortality rate of less than 120 per thousand live births."

2. Policies Influencing Migration.

These are concerned both with internal and international migration. Internal migration is a constitutional privilege in most of the countries. The policy towards

internal migration seeks to relieve population pressures. In most of the countries today metropolitan reasons have very high population growth rates. Therefore, the Governments aim at reducing this pressures. However, it has been reported by the United Nations that most of the developed countries do not have any policy to discourage migration to urban centres. The less developed countries also generally do not depict such policies. Therefore, it has been pointed out that such population policy must be adopted.

Most of the countries today have well defined policies concerning International Rules for entry and exit from the countries are becoming more and more elaborate.Governments are imposing increasing restrictions on international migration. An example of such restriction may be seen in Great Britain at present, particularly concerning immigration of Asians. An Immigration Act adopted in 1971 was enforced in January 1973 to introduce a uniform system of migration control for all the countries.This Act aimed at discouraging immigration. Similar population policy concerning immigration may be observed in Australia. Again, sometimes restriction on emigration are imposed to control 'brain', such as found in India these days.

3. Population policies influencing Fertility.

These may be classified as pro-natalist and anti-natalist.

(i) Pro-natalist policies. Thomlinson has described three approaches to an affective pro-natalist policy:

(a) to accept existing values and attitudes and eliminate or diminish he economic liability of having children.

(b) To modify the norms by glorifying values concerning reproduction. This includes such legal measures as lowering the minimum age for marriage and reinstating the old custom of divorce on the basis of infertility.

(c) To relax the taboos on illegitimacy.

All the above mentioned three approaches were adopted by Hitler in Nazi Germany. Pro-natalist policies have existed since ancient times in one form or the other.They could be seen in Germany, Italy and Japan between the two World Wars period. Sweden has had a highly developed population policy maintaining lowest birth rate in the world. In France, various measures were adopted in pursuance of the pro-natalist policy in the codede law Family of 1939. In 1962 a natality committee was appointed in Israel, which in its report in 1966, recommended the Grant of Financial Aid to large families and restriction on induced abortions. Japan reversed anti-natalist policy by implementing several programmes having demographic

implications such as the Eugenics protection Law of 1949 which made abortion available.

(ii) Anti-Natalist policies aim at limiting the growth of population. This aim is as old as the ancient Greek State. Both Plato and Aristode emphasized the value of the quality of population and sanctioned anit-natalist policy. This was again emphasized by the famous Essay of Malthus published in 1798. It was further accepted by John Stuart Mill when he declared in 1821 that, The great problem is thus to find out how to limit the number of births." Margarat Sanger championed the cause of birth control in more recent years. Anti- natalist policies may be both direct and indirect, short term and long term.

SWEDEN

Sweden, at a times , has proved to be a trend - setter in the field of demographic transformation. It has small population and large territory. It had a population of only about 9 million people speared over to an area of over 450 thousand square kilometers. Its average annual growth rate was only 0.3 percent during 1980-90 . it had declined from 0.5 percent during 1965-80. its fertility rate was 11.7 per thousand , while its mortality was 11 per thousand , and its total fertility rate was 2.1 children per woman. The country had farily high expectancy of 78.3 years with female life expectancy being over 81.2 years and male life expectancy being 75 years only. About 901 percent women in the reproductive age group in Sweden use contraceptives.

Sweden was fortunate in having an efficient health care system, as its infant mortality rate was one of the lowest in the world being only 3.7 per thousand . There was one physician for every 395 persons in the country . The average per capita daily calorie supply in Sweden was 2960 in 1990 . All these indicators speak of an efficient health system in the country, however, there was disparity in the average family size of the relatively low income group and high income group or well- off people ; of course this disparity was not as wide as found in the less developed countries.

About 30 years ago Sweden undertook to examine with care the realation of her population growth to the welfare of her people . Since Sweden already possessed highly efficient health services, a good educational system an efficient economy , a low birth rate and a very low death rate the question of most interest to the country was : Does Sweden need a population policy to enhance further the welfare of its people ? If it does , what form should it take ? in the first place, there appears to have been comparatively little difference of opinion between thoughtful people as regards what was desirable in the way of population growth. the population was already growing but slowly , and a continuance of this slow growth did not seem likely to

have any harmful effect on the welfare of the people . Sweden did not have to face the problem of a probable growth of population at a faster rate than could be provided for by the expansion of her economy that could reasonably be expected. Indeed , there was good reason to believe that the steadily increasing efficiency of the national economy could provide a substantially better level of living for the poorer portion of her population if the distribution of the national income were improved while the volume of the out put was being expanded.

In Sweden as in most other Western countries, but probably to a lesser extent then in most of them, the poorer families were frequently above average size and could not provide for themselves under existing conditions all the essential of that was generally regarded in Sweden as a decent living. It would, therefore, be necessary for the state to come to their aid to a limited extent if they ware to attain a desirable of living and their children were to be given good opportunity to prepare themselves to contribute more efficiency to the national Life.

Many of these large families had more children then the parents desired. It seemed reasonable therefore , as a matter of public policy, to make certain that every couple had easy access to the information and the means necessary to and if the size of the family. It was believed that if control were thus facilities to and if the size general level of living were reasonable good, the government would not need to place much emphases upon the restriction of the size of the family, that must couple, would, of their own accord, decide to have relatively small families. For mentally normal families having more children then could be provided with a good home environment and good opportunities to secure more education where desired, some aid would be provided. In addition, measures were taken to discourage, some aid to prevent the subnormal couples (mentally) from having children when it appeared reasonably certain that these children, would be a life-time burden to the community.

Actually, as far as the direct control of population growth was concerned, only two measures were then activated in the Swedish programme : (1) making contraceptive information more readily available to all couples; and (2) discouraging the reproduction of the mentally subnormal. The other measures were only indirectly related to population growth. The assistance given to normal families unable to provides for their children in a satisfactory manner may be classed as a welfare measure, a redistribution of the national product under taken any significant effects on the growth of population. Altogether , then, the Swedish population policy seems to be aimed chiefly at improving the quality of the population by improving the living condition and the opportunities of the poorer classes and by reducing the size of the genetically subnormal population. The expectation was that when good living con-

ditions for all the people were reasonably well assured, the average normal couple would so adjust its numbers of childrens to its economic status that there would be on need to campaign actively for either larger or smaller families.

UNITED STATES OF AMERICA

U.S.A. with 258 million (1993) people and a density of only persons per sq.km. is one of those fortunate countries of the world pressure. Its territory is not only vast but also is endowed with rich resaources . Since it constituties one of recently settled countries of the world, it has little demographic problems. Its population was small, its growthy rate was low with a fertility rate of 15.3 per thousand and a mortality rate of 8.8 per thousand only (1993). Its infant mortality rate was only 7.9 per thousand and its life expectancy was more than 76.1 years. More than 76 percent of the country's population lived in urban areas.

The United States does not have a specific population policy, although there are various laws that regulate immigration and as such have demographic consequences. Until 1960s the population policies, if any in the United States, were implicitly pronatalist. It was in 1970 that the family planning services and population services and population research act was passed with an objective of extending family planning services to all those who needed them. In 1972, the United States Commission on Population Growth and the American Future concluded that there were no substantial benefits to be gained from continued population growth and that indeed there were many serious disadvantages. This Commission recommended liberalization of abortion laws and other population related policies. It strongly recommended that the contraceptives be made available, to all, including minors; that hospital restrictions on sterilization be relaxed; that sex education be made universally available; and that health services related to fertility be covered by health insurance the most important recommendation of this commission was that the country should plan for a stabilized population. Unfortunately, nothing much has been done at official level to implement these recommendations. It is interesting to not that although the United States has not hesitated to advocate anti-natalist policies in less developed countries, yet it has not established one for itself.

CHINA

In the 1970s, the Chinese leaders declared that, inspite of standard Marxist doctrine relating economic power to large labour force, the huge annual increase in population was a major handicap to economic development. The government adopted a more rigid policy and commenced a vigorous programme to reduce family size to two children. By 1980, the goal was changed to only one child per family(except for unusual circumstances and for some minority groups). This goal is being achieved

through numerous policies. One policy is to postpone the age of sexual activity. The marriage age is generally over 24 for women and 26 for men. and per-marital sexual relations are uncommon.

In China, free contraceptives and abortions are available in clinics throughout the country. From the highest government level down to the smallest rural community, an organizational network exists for implementing the family planning programme. Privacy is limited; women's contraceptive and fertility records are pasted at the local health centres so that any deviation from the norm is noticed. Friends and neighbours may strongly, and repeatedly, urge compliance with the one-child policy.

Social and institutional changes have speeded up the decline in fertility. For instance, better health services reduced infant mortality. More available schooling and the accompanying higher literacy of females were instrumental in reducing birth rates. Also, with the role of women expanding from that of a traditional housewife to include work in a factory or profession, fertility rate declined.

Moreover, the necessity to raise sons for old-age security has diminished. In urban areas there are retirement pensions for workers. In rural areas, until the early 1980s, the commune guaranteed food clothing, shelter, medical care and burial.

Under the one-child policy, penalties are assessed against families who have more than one child. These penalties vary with local conditions, but they may include ineligibility for better housing , reduced educational opportunities, delayed food rations, fines, and other economic and social sacrifices.

Despite all these policies and steps, opposition to the one-child campaign does exist, especially in relatively poor rural areas. Dissatisfaction is reflected in the fact that many couples having more than one child.

Owing to the one -child policy , China is rapidly moving into the fourth stage of the demographic transition. In contrast to the European experience, this shift is being achieved while still remaining largely niral and agrarian. China has accomplished this by creating a social climate where people do not see themselves as independent individuals but instead identify with the state . In effect, the Chinese are practicing birth control for the country. A high degree of political organization, as well as social control, economic incentives and public motivation, is a prerequisite for this kind of programmer.

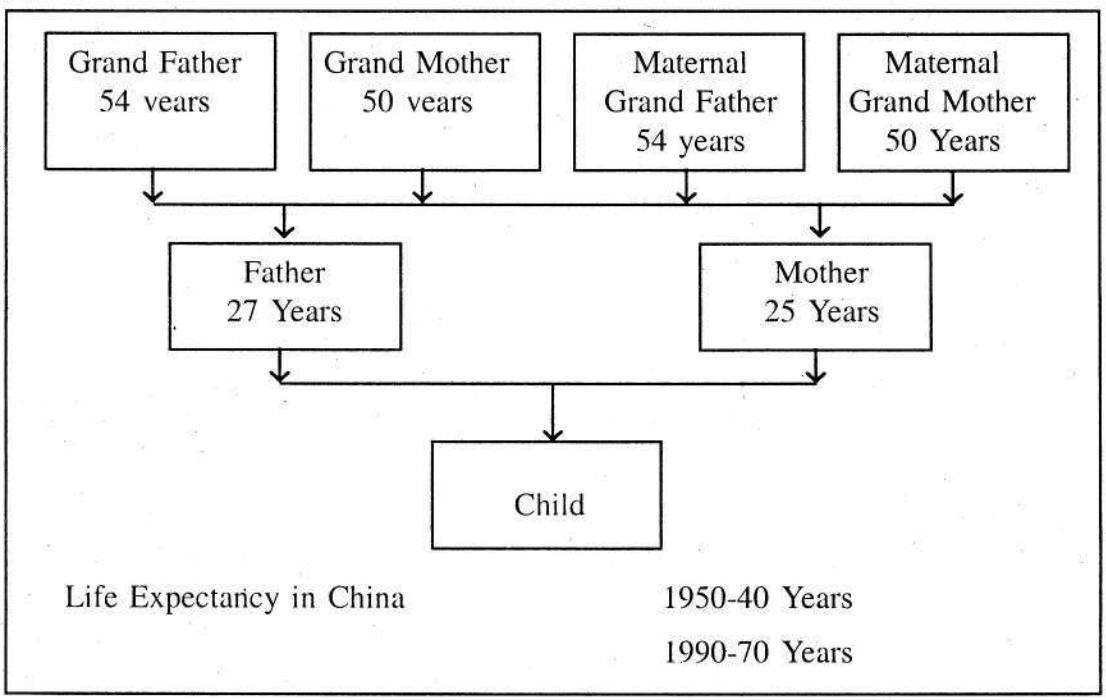
The one-child policy of China has its own merits and demerits. It has been appreciated and criticized by some of the leading experts in the field of population studies. The policy is usually justified because of the potentially dire consequences of an increasingly large population. Although the Chinese agriculture produces high

yields per unit area and the standard of living and longevity have improved throughout the country and recent decades, there are worries about the future. Those who support the one child policy are of the opinion that continued improvement in standard of living can only be achieved by limiting the size of future population. The supporters of the policy also argue that since China is having over one -fifth of the world population, the well being of future of population throughout the world will be affected by the decision made today about the size of the Chinese families.

The supporter of the policy insist that it is flexible enough to allow exception, such as in areas where manual labour is important and in reason of minorities (e.g., the Tibetans sinking, Inner Mongolia and Uiggurs).

Despite all these merits, there are many experts, even within China, who disagree with any policy that will greatly diminish the number of adults in the next generation. According to them, continuous population growth is the key to economic development which lead to better standard of living, happiness, leisure and increases the life span of the people. In case of low growth of population, the country will suffer from a shortage of worker and military personnel.

China's One - Child Family Model



The one-child policy has also been criticized because of the long-range effect of a 1-2-4 (age structure one child , Tow parents and four grand parents). In such and age structure there will more pampering of child. There are complaints about the excessive amount of pampering that single child receive from parents and doting grandparents. Sociologists speculate that these pampered children, when they become adults, will alter the Chinese society unfavourably. Moreover, a continuation of the policy will alter the mean that in future the higer percentage of elderly people will depend on a smaller portion of working adults. This will lead to high dependency ration which the pampered child may not bear.

The policy has also been ctiticized on the ground of individual freedom. Birth statistics by gender in China indicate that female infanticides have occurred in some areas. These statistics seem to reflect a reluctance by some families to abandon the tradition of having several children, especially sons. An increase in the the proportion of eldery persons can affect the future market for various kinds of goods and services, both those sold to young people and those sold to elderly persons. An aging population also enlarges the dependency ration which, in turn, can affect financial systems, such as social security programme.

Most countries concerned about population growth are attempting to combine economic development with the provision of family planning services. The economic development and social change provide the motivation to have small families. Reducing infant moratality, expanding education systems, broadening the role of women, and achieving economic growth—all have been important catalysts in changing traditional attitudes towards the family. Once the motivation is there, family planning services provide the means for bringing the birth rate down.

INDIA

The Indian policy -makers realized the importance of population control as early as 1951-52, but a ridig policy was not adopted to arrest the fast growth of population. In 1961-71, the population growth rate was 2.25 which was the highest at any decade after independence . At present, the population growth rate has declined to 1.6 per cent. During the post -independence period , the death rate has been controlled and medical facilities have been extended to the far-flung villages of the country, yet the explosion of population may be attributed to numerous physiological socio-economic and cultural factors.

When the population policy was designed in the First Five-Year Plan of India, it was realized that the base of population is already very large and the trend of population growth cannot be altered easily and quickly. The plan enunciated that the programme for family limitation and population control should: (a) present an accu-

rate picture of the factors contributing to the rapid increasse of population;(b) discover suitable techniques of family planning and devise methods by which knowledge of these techniques could be widely disseminated ; and (c) give advice on family planning as an integral part of the service of government hospitals and public agencies. The meager Five Plan provision of Rs.65 lakh for the family planning programme was too little to yield any far-reaching results.

In the Second Five-Year Plan, the voluntary sterilization population policy was introduced .The family planning programme was provided an amount of Rs.5 crore and it was during this period that 1,650 family planning centres were established in the different parts of the country.Consequently, the family planning programme made an appreciable progress during the Second Plan.

The striking growth rate of population compelled the government to adopt a relatively more clear and less flexible policy of population.It was in this plan that the programme of family planning, involved intensive education, provisions of facilities and advice on the largest scale and widespread popular effect in every rural and urban community. Further, the clinical approach of the first two plans was replaced by an extension education approach aimed at bring the messages and services to the people in the far off areas of the country through a network of family planning centres. The masses were educated about the merits of small family and the eligible couples were motivation to adopt the prentive methods of population growth. Moreover, there was more emphasis on education and employment of women. In the Third Five-Year plan Jogistics were provided for family planning which motivated about which one million people to accept sterilization.

More emphasis was laid on the family planning programme in the Fourth Five-Year plan. The most distinctive feature of the Fourth Plan was that it set a time-bound target of reducing the birth rate from 39 per thousand to 23 per 1,000 by 1979. The outlay for the Fourth plan was raised to Rs.286,crore. Consequently, by the end of the plan , about 9million couples were covered under sterilization and about 6 million couples were covered by other family planning methods. About 7 million births were estimated to have been averted during the plan period.

In the Fifth Five -Year plan,Rs.500 crore were provided for the family planning programme. The programme sought to integrate most of the basic social services, including education and public health services with family planning and nutrition of children, expectant and nursing mothers. A more rigid policy with an element of compulsion, monetary incentives, penalties and legalization of abortion during the Fifth plan made the Indian population policy more effective.

High priority was given to the family planning programme in the Sixth Five-Year Plan .The strategy during the plan was to integrate health, family welfare and nutrition services at all levels. Monetary incentives and full rebate in income tax for specified donations for welfare purposes were given by the government. The birth reate was to be reduced to 30 per thousand by the end of 1982-83. The vigorous population policy, followed by the Indira government in the late seventies, was opposed by the masses.

In the Seventh and Eighth Plans, a more pragmatic policy was adopted. There is more emphasis now on persuasion, publicity and family and individual well-being.

Despite all these plans and policies, the population of India is growing at a faster pace and taking the space of population explosion. The economic development and riding standard of living of some of the people are not adequate to bring down the population growth rate. The time factor is soof the vicious circle through a direct assault on this problem. In the middle of the last decade, an attempt has been made to rejuvenate the National Family Welfare Programme.The Ministry of Health and Family Welfare has set up three market research organizations to conduct independent evaluation of the family planning programme and to make a diagnostic study on the perception, attitudes and practices of the people towards family planning and use of contraceptives.

The revised strategy seeks to broaden the area of family planning by including areas beyond the health sectir, such as child survival, women's status and employment, literacy and education and socio-economic development including anti-poverty programmes. It also stresses to make family welfare a multidisciplinary and integrated effort of all relevant departmental agencies and to make the programme a genuine voluntary pleople's movement.It is with this objective that age of marriage is being raise for women from eighteen to twenty years. For raising the status of women, female education is getting adequate emphasis.Effects are also being made to involve the voluntary organigation to promote family planning . Commitees have been set up at the state, district, block and panchayat levels to discuss population growth and family welfare projects. None of these steps individually can bring the growth rate low, their package application is essential to achieve the goal of slow growth of population without affecting the declining death rate .The government has to be more serious about the population policy and in case population growth is not checked , all the economic gains through planning will be diluted and India will remain a country of poor and illiterate people.

NATIONAL POPULATION POLICY, 2000

The National Population Policy, 2000 (NPP, 2000) affirms the commitment of Government of India towards voluntary and informed choice and consesnt of citizens while availing of reproductive health care services, and continuation of the target-free approach in administering family service. The NPP, 2000 provides a policy framesworks of advancing goals and prioriting strategies during the next decade to meet the reproductive and child health needs of the people of India, and to achieve net replacement levels (Total Fertility Rate) by government, industry and voluntary non-government sector working partnership.

Objectives

The immediate objective of the NPP, 2000 is to address the unmet needs for contraception, health care infrastructure, and health personnel, and to provide integrayed service for basic reproductive and child health care. The medium-term objective is to bring the TFRto replacement levels by 2010, through vigorous implementation o intersectional strategies. The long-term objective is to achieve a stable population by 2045, at a level consistent with the requirements of sustainable economic growth, social development and environmental protection.

In pursuance of these objectives, the following national socio-demographic goals to be achieved in each case by 2010 are formulated:

1. Address the unment needs for basic reproductive and child health services, supplies and infrastructure.
2. Make school education up to age 14 free and compulsory and reduce dropouts at primary and secondary school levels to below 20 percent for both boys and girls.
3. Reduce infant mortality rate to below 30 per 1000 live births.
4. Reduce maternal mortality rate to below 100 per 100,000 live births.
5. Achieve universal immunization of children against all vaccine preventable diseases.
6. Promote delayed marriage for girls, not earlier than age 18 and preferably after 20 years of age.
7. Achieve 80 percent institutional deliveries and 100 percent deliveries by trained persons.
8. Achieve universal access to information/counseling, and services for fertility regulation and contraception with a wide basket of choices.

9. Achieve 100 percent registration of births, deaths, marriages and pregnancies.

10. Contain the spread of reproductive tract infections (RTIs) and sexually transmitted infections (STIs) and the National Aids Control Organization.

11. Prevent and control communicable diseases. 12.Integrate Indian System of Medicine (ISM) in the provision of reproductive and child health services.

13. Promote vigorously the small family norm to achieve replacement level of TFR.

14. Bring about convergence in implementation of related social sector programmes so that welfare becomes a people-centered programme.

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2.7 QUESTIONS

Long Answer type of Question :

1. In what way do the population problems of developed countries differ from those of developing Countries ?
2. Two many people, in two little land'. To that extent is this a satisfactory statement about over population ?

3. Assess the impact of population explosion on resources.
4. What is fertility rate ? Discuss the social and economic determinants of fertility. Give an account of the population policy of India.
5. How fertility is measured ? Give an account of the differential fertility of two world.
6. Define mortality. What are the different methods of measuring morality ? Discuss the rural-urban differential of mortality.
7. What is migration ? Analysis different kinds of migration with suitable example.
8. Explain Ravenstein's and let's laws of migration.
9. What are the different types of internal migration ? Discuss their causes in details.
10. Write a note on the social and economic determinants of migration.
11. Discuss the problems associated with migration movements (a) in the rural areas from which migrant originate and (b) in the towns to which they go..
12. Discuss different determinants of migration. Assess the consequences of migration with suitable example.
13. Write an account on the globe pattern of migration since second world war.
14. Discuss the reasons for international inigration of population.
15. Discuss the consequences of international migration with example.
16. Why do large-scale international migration of population occur ? What problem take place as a result of such international migration ?
17. Critically analysis the demographic transition theory. Discuss the causes of differential stages of demographic transition in various parts of the world.
18. What is meant by the population trao or limits to population growth ? Discuss Amartya Sen's approach in this respect.
19. What are the causes of poverty in India. What steps have been taken by the Govt. of India to reduce poverty.
20. What is poverty ? Explain causes of poverty in cities.
21. What are the reasons behinds poverty in Ethiopia.
22. Suggest some resources to reduce poverty in that country.

23. Discuss Govt. of India's efforts for the welfare of the backwards classes.

24. What is meant by gender discrimination? What are the various forms of gender discrimination ? How this problem can be solved ?

Short type of questions :

(1) What is the relationship between over population and population explosion?

(2) How population explosion can be checked? Describe the migration pattern in Europe since second world war ?

(3) Explain the different measures of fertility ?

(4) Assess the fertility status in developed countries of the world ?

(5) Discuss sources of fertility date.

(6) Discuss the factors associated with long term decline in fertility in developed countries.? 5

(7) Discuss the mortality feature of India. Discuss the Marxian theory of population growth.

(8) Explain the different measures of mortality.

(9) Write a short note in the various determinants of mortality.

(10) Explain the terms immigration and emmigration. 5

(11) Explain the seasonal migration pattern in India.

(12) Explain the causes and effects of seasonal migration.

(13) What do you know by internal migration.

(14) Explain the causes and consequences of forced migration.

(15) What are the sources of date of internal migration?

(16) What are the methods of measuring internal migration ?

(17) What are the basic determinants of immigration in U.S.A ?

(18) Analyses the consquences of population migration in India during post independence period.

(19) Discuss how migration helps in urbanistion.

(20) Illustrate the essence of demographic transition theory.

(21) Explain Malthus' theory of population growth.

(22) Write an account on the population policy of India.

(23) Write an account on the population policy of Sweden.

(24) Write an account on the population policy of USA

(25) Discuss Marxian theory of population growth.

Write short notes on :

Fertility measures

Economic determinants of fertility

Mortality measures

Morbidity

Population problems of developing countries.

Population problems of India.

Demographic Transition in the Third world.

Impact of population on development in India.

Social & Religions causes of migration .

Wars and migration

Forced migration

Rural to urban migration

Urban to rural migration.

Rural to rural migration.

Lee's model of migration.

Zelinsky's mobility transition model.

Gender discrimination in Ethiopia.

Gender deiscrimination in India.

Poverty in Pakistan.

Poverty in China.

Model objective types Question :

What do the following terms mean

Death rate.

Birth rate.

Infant mortality rate.

Life expectancy at birth.

Demographic transition.

Seasonal migration.

Fertility.

Zero population growth.

Illegal immigrant.

Push factors.

Gender discrimination.

Backwardness.

Poverty.

Famine.

Unit 3 ❑ THE ORIGIN AND GROWTH OF SETTLEMENTS

Structure

3.0 INTRODUCTION

Early Settlement

No one knows which were exactly the first settlements or when they began to grow. Archaeological evidence in the Indus Valley, Egypt and other sites of early civilization bear testimony to the existence of cities. But even before man built walls of stone and morter, he must have used simpler objects such as leaves and thatch. It is presumed that these materials could not withstand the assault of time and therefore not left much trace had behind. Historically the first settlements began to form in the Neolithic period. Agricultural activity also began then. Burial sites of this age such as Stonehenge at Salisbury Plain in England, seem to indicate that there might have been settlements nearby.

Settlements come into existence mainly because of the gregarious nature of man; they are also expressions of their response to the environment. When man alienated himself form nature, he gradually created a lifestyle that depended to a large extent on family, community and kinship. This interaction between individual and individual, group and group, individual and group, needed a concrete medium - the settlement. In fact, it makes sense to think that the first settlements were a system of villages which had some degree of interaction, rather than just isolated groups of houses having no contact with each other. If not in any other manner, gravitation around the chief of the different groups would result in different clusters that interacted either in war or in friendship.

Village life can be sustained only when sedentary agriculture, bring a more assured reward from the land, is adopted. Hence the earliest villages - first established in the alluvial valleys of the Near Bast - date from the dawn of cultivation in

Neolithic times. Co-operation in tilling the soil, in control ling the rivers and organising irrigation and drainage systems, and in distributing the harvest, all favoured the com pact settlement. Protection against wild animals and human raiders was also more easily ground when communities gathered together in a fixed group of houses. What is true of a farm village is equally true of a fishing village, for the maintenance and handling of boats and nets, the perparation of the catch, and - along salmon rivers, for example - the management of weirs and traps, all call for a co-operative effort.

Perpillou says that a compact settlement such as a village is always evolend due to some form of constraint : physical constraint when people are ill equipped to deal with the environment and can succeed only by forming a group : technical constraint when the nature of the equipment demands group activity, e.g. for maintaining dykes and large mechanical appliances; agrarian constraint when the crop rotation system and the work calendar demand a set course for using the soil, and social or political constraint which may be imposed either by a powerful landowner or by the government. The latter is well illustrated by the Israeli collective or kbbutz and the Russian collective or kolkhoz. (Ghosh, 1998)

Once established, a village may occupy the same site for hundreds, even thousands, of years. In the Nile valley, for example, most Egyptian villages, including some probably 6,000 years old, stand on low eminences artificially raised above the flood-level by the superimposed leyers of old buildings and their rubbish dumps. Many village in China are undoubtedly 4,000 years old. In southern Italy there has been continuous village occupation since the Bronze Age, in southern France since the days of the Romans and in England at least from Anglo-Saxon and days of the Romans and in England at least from Anglo-Sexon and Scandinavian times. (Ghosh, 1998)

3.1 EVOLUTION OF RURAL SETTLEMENT

Introduction

The alteration of the physical condition of a region through natural processes forces men to give up their age-old occupations and to take up new ones. This is followed by a corresponding redistribution of population. The latter phenomenon is also motivated by a change in the economy of the region, through a change in the mode of production. (Sen and Sen, 1989)

It is needless to say that rivers are of vital importance in a deltaic land of their own creation. The rivers of the Bengal delta were responsible for a particular form of economy of her people who concentrated along the banks of

the rivers. But deterioration of the river channels coupled with human interference brought in a number of problems including agricultural decline, beginning of malarial fever, periodic growth and decay of population and tendency of clustering of population away from river banks to sites along railways and roads.

The moribund Ganga delta has been selected here for the study due to its very special settlement problems. In this moribound Ganga delta when the land-building activity of the rivers ceased, there set in a period of physical stagnation, a period of transition to a more stable physical environment. This transition witnessed the worsening of the salubrious climate with consequent downward trend in population density and decline in agriculture in comparison to earlier periods (pre- 1850s). After the lapse of a century, the study area suddenly experienced a cataclismic increase of population which are not due to any improvement in ecological situation, but owing to mass immigration from the then East Pakistan (Bangladesh), which was followed by a larger cropped area and other manifestations of economic development in post-independence period.

STAGES AND FACTORS OF SETTLEMENT EVOLUTION

Moribumd Ganga Delta : A Case Study in General

Three distinct phase in the evolution of rural settlements can be discerned from the above study. They are : (a) pre-1850 period, (b) 1850 – 1945 and (c) 1945 to 1985.

The first period may be called a period of prosperity when the growth of population was unabated.

The second period witnessed decreasing population due to malarial fever and emigration of population from this decadent area.

The third one is a period of revitalization from depression. Attempts were made to overcome or to adjust with the existing ecological conditions in the wake of huge immigration of population from the erstwhile East Pakistan. The last period can be subdivided into four sub-periods :- (i) 1946-47, (ii) 1950, (iii) 1964 and (iv) 1970-71. All these sub-periods witnessed immigration of Hindu population, from the then East Pakistan and emigration of Muslim populations in the reversed direction, the first one (immigration) exceeding emigration in numbers.

In the case of the above two first sub-periods, it is noticed that the government attempted for rehabilitation of the displaced Hindu population during the period 1946-50. Many of those who immigrated in West Bengal in 1 964 forcibly occupied

vested land all on sudden (within one night). Many such colonies are coined *Hathat* (suddenly developed) Colony. Some of those who took shelter in India in 1970-71 during the liberation War in Bangladesh returned there, but the majority of them settled here. Many of them took shelter along the roads and railways and linear settlement is the characteristic since them.

The study analyses the operation of the triangle of forces representing physical environment, social processes and economic structure on the settlement pattern and identifies the nature of change registered during the period 1850-1985 in this part of Bengal. It explores the whole gamut of questions related to man-nature interaction in an ecologically sensitive area where every natural cause is likely to produce an effect on the human sphere in proportionately the same order of magnitude and eventually forces man to reorganise his activities in space.

(i) Physical Factors

The physiography of the region put limitations on the growth and distribution of population. The extreme northern part of the region experience swinging behaviour of the river Padma and as such, there are many uninhabited villages here. Immigration of displaced persons from Bangladesh is also very low here. Kalanter, a low-lying saucer-shaped area, also restricts infiltration of population in this region.

However, of all the factors, the role of rivers was the most important, for the deterioration of the rivers gave rise to a chain reaction. In the early stage of settlement development, the marshy environment of the tract provided ideal condition for livelihood of fisherman and hunter. In the 16th centrury, the fertility of the region attracted European settlers for the production of silk, for which they built trade houses (kuthis) along river banks. Recurrent deposits of silk enriched the soil to grow some special crops like mulberry, indigo, cotton, tobacco, suger, millet and barley in the early- 19th century. Thus, in the pre-railway era, majority of the settlements as well as some notable ganjs developed along river banks. As far as records are concerned, the rivers were witnessing human interference from the early- 19th century, thus modifying their courses as well as misusing their beds. Following the construction of railways in the mid- 19th century, the region had to face severe catastrophies, as it became necessary to strengthen the existing embankments. This operation prevented the flow of flood- flushing water and silt. Consequently, malarial fever broke out and the area under study became impoverished. Misuse of drainage channels led to such scarcity of water that people were forced to take dirty and unhygenic water. Sometimes, this led to cholera in an epidemic form.

The deterioration of the rivers had far-reaching effects. With the gradual decay of the rivers and consequent closure of river traffic for the major part of the year and

subsequent development of roads and railways, a realignment of settlements from river banks to road sides took place. This fostered the decay of village economy, because those village were dependent on rivers.

*(Sen & Sen, 1989 : **Evalution of Rural Settlements in West Bengal,** 1850-1985)*

(ii) Social Factors

Unhygenic condition of the villagers contributed largely to the spread of malarial fever and habits and superstitions of people aggravated the problem. One homestead was very close to another. The houses were devoid of windows and latrines. Use of mosquito nets was not in vogue. People were superstitions about medicines. Moreover, segregation of cholera patients was impossible. The clothes they used to wear washed in pool from which surrounding house-holders drew their water. Cholera, which usually broke out at the beginning of the summer, was due to use of unclean water from dirty and weed-grown tanks. The same tanks were also used for washing and other domestic purposes. Due to these habits, fever of any form broke out and it spread like wild fire.

(iii) Economic Factors

Agriculture was the occupation of the majority of people, but agricultural performance was very poor, mainly due to peculiar land tenure system, known as *utbandi* and partly, due to the oppressive attitudes of the zamindars aimed at extracting maximum money from the tenants. Under the utbandi system, the tenant paid rent only for the land which he cultivated each year and he could not acquire occupancy rights, unless he tilled the same land for twelve consecutive years which in fact, he rarely did. Meanwhile, the landlord could raise the rent at his pleasure and if the tenant refused to pay, he would be rejected. Naturally this tenure deprived the tenant of any incentive to improve the land and simultaneously encouraged rack-renting. The high rent of land in utbandi system forced the cultivators either to sell or transfer their land to the owners through the *gomasia* and they were turned into agricultural labourers. Under the British administration, land revenue rate increased at an alarming rate. The administration was creating pressure on the zamindars. This resulted in a gradual increase of sub-tenancy of land. Thus, as the new zamindars were city-capitalists and therefore absentees, they had least interest in agriculture, philanthrophic works as well as economic development of the villages. The meet their monetary requirements, they exerted different types of oppressions. Thus, while land taxes were high, prices of agricultural commodities were low and a farmer had to depend on mahajan for loan.

Like agriculture, the decay of trade was brought about by indifferent attitude of the government. There was no incentive to cottage industries like world renowned ivory carving industry. Murshidabad silk known as *Baluchari* silk cotton weaving of Santipur known as Santipuri Muslin, brass metal industry known as Khagrai Basan (utensils) conch shell, shola and so on. No doubt, the decline in local cotton and silk products was due to new trade policy of the British administrators who patronised their own home products at the cost of native products. While this was the state of affairs, the British raj introduced indigo cultivation at the cost of food crops, which ultimately led to clashes between the planters and *raiyats,* resulting in a sharp decline in cultivation. In case of navigation, it is clear that the government attempted very casually to keep the mouths of the rivers open throughout the year for riverine traffic. Steps were not taken to maintain the rivers in proper regime by constructing sluices and regulator at the heads of the canals which were possibly considered expensive and redundant measures. Government records, show that water crisis of this region was altogether an imaginary one. The country everywhere was intersected with canals and if the mouths of these canals were supplied with flood gates and closed when the rivers began to fall, an ample supply of water could be retained for the whole year. In fact, the British government generally saw water provision as short term famine make work projects and invested in large-seals irrigation facilities only when it believed that it would receive an acceptable cash return on its investment as in the case of the medinipur High Level Canal.

This disparity is due to the fact that "Indian administration was very considerably influenced by the trend of public opinion in England and not by the opinion of the people of India. Englishmen understand railways and do not understand the importance of irrigation for India, wrote R. C. Dutt. The attitude of the administration on the resettlement question is clear from the following letter.*' it appears, however, that no systematic steps are being taken to raise the sites of the houses above flood level and it is obvious that the amount of Rs. 3,600 will go a very little way towards raising the sites of the 4,142 houses with mat walls. Even this expenditure whould have to be repaid." That is why the public prefer rebuilding their houses on lod embankments, as they were" unable to repay advances."

(Dutta, R.C. 1903, ***The Economic History of British India under Early British Rule)***

The factors discussed so far created such an environment that forced the people to emigrate from this decadent area and the Census Report of 1921 maintained : "This stream of migration began to flow more than 40 years ago but has increased very much in volume science 1891 and appears still to be increasing".

The effect of emigration and mortality was felt in "Shortage of labour" and deficiency of food crops. Land remained untilled and did not yield full crops. Moreover, some portions of cultivable areas as well as settlement sites were converted into jungles. .Again Mukherjee noted that there was a close relation between depopulation and agriculture, because to meet the labour requirement, the agricultural tribes moved into these decadent areas. It is to note that the agricultural proficiency of the aboriginal tribes was of a low order and though fallow land was brought under tillage, agricultural decline could not be checked at all with the result that in some of the more decadent areas, land fit for cultivation often remained untilled and tended to be covered with jungle and there were more land than there were cultivators. Thus stagnancy was created in the agricultural sphere of the area where the soil was gradually becoming infertile on account of the gradual silting up of the river channels.

*(Mukherjee, R.K., 1938 : **Changing Face of Bengal**)*

The scene changed rapidly after the partition of the country. Because of its situation near the international boundary, the study area experienced huge influx of population from the East Pakistan. This movement became pronounced after the riots of 1950 and 1964 and genocide in 1970.

The study area experienced huge immigration of population in the years 1946-51. However the year 1950 experienced the maximum immigration and Nadia witnessed the highest immigrants in comparison to other districts.

In the demographic scene, it is obvious from census reports of 1951 and 1961 that there had been a fall in the death rate and infant mortality and an increase in the number of bachelors in the later period (1961).

It is now pertinent to discuss the effects of this huge growth of population of post-1947 period on the rural settlements which were manifested in (a) siting of settlements, (b) spatial distribution of population, (c) morphological changes of the villages, (d) caste system and (e) agricultural improvement.

(a) Siting of Settlements

A comparative study of Survey of India's topographical sheets surveyed in the sessions 1961-17, 1950-51 and 1968-69 shows higher concentration of settlements along roads and railways in 1950-51 than in 1961-17. This is due to the fact that slow-moving river transport was increasingly replaced by fastmoving surface transport. Moreover, because of lean discharge, the river traffic remained closed for the greater part of the year.

Thus ribbon-like spread of settlements along roads and railways is characteristic of many areas. For instance, almost the whole stretch along the Dum Dum - Bangaon rail route (North Twentyfour Parganas) of E.R. contains ribbon-like settlements. This type of linear settlement is also found near Palpara, Birnagar, Taherpur, Krishnanagar and Bethuadahari R.S. of Ranaghat-Lalgola section. A comparative study of 1950-51 edition and 1968-69 edition of topographical sheet No. 79 A/2 shows high concentration of settlement along roads, railways and thin concentration along the char area of the river Bhagirathi in 1968-69 edition than in 1950-51 edition. Instances of new settlements along roads are Chunakhali (Type 3, case study i), Sibpur (Baharampur P.S.), Debagram (kaliganj P.S.), Kamgachhi, Bera Kamgachhi and Sim Aistala (Ranaghat P.S.). A comparative analysis of 1950-51 edition and 1968-69 edition of topographical sheet no. 79 A/6 shows that new settlements along new roads have developed in the fringe area of Kalantar, viz. Nutan Arbetai, Barea Nutanpara, Berea Mathpara, Abhayanagar, Nutanpara, Nutan Bilkumari, Nutan Betai under Tehatta P.S. All the above settlements have been built by the economically weaker people of the East Pakistan. The choice of sites along roads and railways is due to the fact that those places are public property and as such, they could avoid clashes with private landowners. So, they illegally occupied such vested land for building huts.

However, in some cases, the local inhabitants have also built new homesteads along the roads. The growth of settlements in the Muslim dominated Beldanga and its neighbourhood is due to the growth of family members of that community. The interesting point to study is that certain areas, such as kalantar locality and Kaliganj P.S. remained free from Immigration of displaced persons and therefore, the changes in the settlement character is negligible,

(b) Density distribution : Factors

(i) Physical and economic factors

Irrespective of soil character, density distribution tends to be equal in almost all the P.S. at present. However, in the *char* area of the river Padma and kalantar locality, density still remains low. Nevertheless, there are some pockets of high concentration of population and these are due to following factors : (i) Suburban locations of Ranaghat, Chakdaha, Bangaon Gaighata and Habra P.S. where there are ample scope for various occupations, (ii) One section of the displaced population, driven by despair, forcibly occupied large masses of land which remained in jungly, water-logged areas. Because of this, some villages with high growth rate of population are observed in this region, (iii) During resettlement, particular castes chose specific sites which were

conducive for carrying on their trades. For instance, the immigrant *Jelias* (fisherman) settle along the riverin villages, viz. Coalsalua, Anulia, Raghunathpur (Ranaght P.S.), sibnibas. The displaced Tanti caste settled in the *char* area of Nabadwip P.S. as well as Santipur, Phulia, Nabadwip, Ranaghat towns and their heighbourhoods. The *Goalas* (milkman) supply milk to the towns, particularly the Calcutta Metropolitan District (CMD) area and as such, they also settled in or near the towns. Agricultural population settled in the village. But those who follow different professions like cottage industry, trade and commerce and miscellaneous secondary activities settled near the communication lines.

(ii) Cultural factors

Specific cultural background is responsible for unequal distribution of two religious groups. In Murshidabad, percentage of Muslim population in the total population is high, while in the other two districts, Hindu population constitutes the majority percentage. Following partition of the country, the region had to face both immigration of the Hindus and emigration of the Muslims. Exodus of the Muslims has been negligible were they are majority in numbers. Similarly, where they are minority, they have moved away from those villages and have settled later in one where they are majority For instance, the Muslims who were minority at Sibpur, Madapur left those villages and settled at Muslim - dominated Hekampur village, all the three villaves are under Baharampur P.S. In Nadia, influx of Hindu population has been highest among the districts of West Bengal. It is because Nadia comprised five subdivisions in the pre-partition days, but only two in post-partition days. Many of the Hindus of the then East Pakistan immigrated to the Indian portion of Nadia for psychological reason, (ii) Hindu population settled in villages. The high castes, especially the middle-income group, settled in towns and their suburbs, mainly due to the advantages of higher education and employment in towns and party due to their sophisticated culture.

Since 1977, some new settlements have come into being due to repeated robbery. For reasons of safety, the inhabitants are taking shelter in big villages or towns. This causes a decay of a hamleted settlement.

(c) Morphological changes of Villages

The study area witnesses depopulation and overpopulation. In some cases, a village experienced both the phases. It so happened in pre-independence days that when a village site became jungly and therefore unfit for habitaion, the residents chose a new site. Instances are Paraspur Chhatai (J. L. No. 123) and Dakshin Sahar (J.L. No. 124) of Murshidabad P. S., Dolaimolla (J.L. No. 35, Knshnanagar P.S.).

Some of the residents of Chhatai established Hanrampur Chhatai, a hamleted village on the bank of the river Bhairab. Similar instances are Dihipara and Diarapara which sprang up from the disintegration of Dakshin Sahar.

(d) Effect on Caste System

The huge influx of population affected (i) caste-based economy, (ii) spatial distribution of caste pattern and (iii) rigidity of caste system.

(i) "Function and function only ..... was the foundation upon which the whole caste system of India built up. It is only in the course of the last eighty years, with the rapid destruction of traditional skills, designs, techniques, markets and patrons, with nothing in their place to offer to castes so long employed in them who sudenly found themselve sast off their moorings, obliged to take to vocations other than their own, that caste lost whatever significance it had in the organisation of production. Caste system based on occupations has lost much of its importance due to poor remuneration from caste-based products. Because of this, people emigrated to distant places in search of employment. For example, movement of population in the Hugli Industrial Belt of Calcutta and its suburb in the pre-independence days. Presently, improvement in agriculture has brought some stability in the economy of the village and the people, irrespective of their caste belongings have adopted it as their main profession. Nevertheless, caste-based occupations are primarily followed by few caste, viz. *Tanti, Goala, Barui, Jelia and Muchi.* Occupations followed by the first three castes are still remunerative.

(ii) Caste segregation has largely been abolished. During rehabilitation of the displaced persons, it was particularly observed that all the castes were living together, because of necessity of security from dacoities, common follow-feelings among the refugee people who formerly belonged to the same district.

(iii) During field work, it was reported that some people prefer to belong to higher caste. For example, the villagers who previously belonged to *Chasa dhopa* caste, a section of Scheduled Castes, and farmers by profession, identify themselves as *Satchasi* caste which is higher in caste hierarchy than the former. The same incident was noted in Chunakhali village (-Type 3, case sludy i) where the people belonging to *Chasa-dhopa* caste had abandoned it in favour of *Moyra* (confectioner) caste, although most of them are cultivators by profession. An interesting case was noted in Phulia village where the Scheduled Tribes population had adopted 'Sen' title, a title used by *Vaidya, Kayastha*, and *Swarnakar* in Bengal, for some economic gains.

(e) Agricultural Improvement

In the pre-independence days emigration, high rent of land and physical disadvantages like low productivity of soil, uncertain rainfull adversely affected agriculture. After the independence, the situation changed gradually. Both natural growth and immigration from the then East Pakistan caused high pressure of population and this induced the farmers to cultivate land more intensively. Implementation of the zamindary abolition act in 1954-55 gave the farmer a permanent possession over land. In the 1960s, agricultural infrastructures like fertilizers, high yielding seeds and irrigation were available through the Block Development Offices. In the 1970s, agricultural institutions like C.A.D.C., S.F.D.A. AND co-operative land development banks came to help the farmers. All these efforts had their impact on the improvement of production, assurance of agricultural output and high intensity of cropping. Due to the practise of multiple cropping, farmers remain engaged in employment more or less through out the year and because of this, emigration from the villages sharply dropped.

In the economy of the country, mulberry (silk) played an important role since early times. Since independence, mulberry production has been some revival. Jute now occujpies the status of an important cash crop. Wheat as a food crop has gained popularity. The establishment of some sugar mills and collection centres introduces a new element in the economy. High profit are responsible for an expansion of its (sugarcane) acreages. Settlement geography of the study area reflects these changes.

The aspiration for higher learning and the desire to acquire new skills has led to an expansion of educational institutions which are playing a vital role in the cultural field by providing an atmosphere for the exchange of pure drinking water are some of the new elements of the cultural landscape.

The only way to understand settlements is to study the region in the totality of its physical and cultural environment. A regional approach is therefore needed. Settlements respond very closely to regional physiography, to the interplay of social and economic forces of the region. The moribund Ganga delta is an instance to this response.

3.2 EVOLUTION OF URBAN SETTLEMENT

Introduction

Griffith Taylor while examining the urbal settlements of Canada recognized four stages of urgan growth which are as follows :

The Infantile Stage :

The smaller town has been considered in this stage where the separation of commercial and residential areas could not be separated and the buildings and lanes are haphazardly distributed. Teghra in Begusarai district is an example of this stage.

The Juvenile Stage :

In this stage the skyline of the houses rise and the factories are also established at places. Munger is an example of this stage.

The Mature Stage :

This stage is marked by well separated residential and commercial area. The rise of new colonies on the fringe and vertical expansion is the rule. The urban centres of Ontario, Delhi, Patna, London, Dar'es Salaam and Cairo come in this stage.

Senility :

This stage is marked by cease of growth, decay of some areas and decline in economic development. In Britain, the industrial towns of Lancashire, Yorkshire and Durnam are some of the examples. In Uttar Pradesh, Agra, Fatehpur Sikri, Mathura and Muzaffarnagar are towns of senile stage. (Mondal, 2000)

Mumford's Classification of the stages of Towns

As a physical entity, social phenomena, technological advancement, cultural ties and historical evolution Lewis Mumford (1938) considered the stages of growth of towns as follows.

Eopolis : It is a small town of village origin-which are based on agriculture, mining and fishing.

Polis : It is a sort of market town with wholesale grain market and retail market. Some industries may also be found at this stage.

Metropolis : It is a large city with at least 10 lakhs of population. It has dominating position on neighbourhood towns and cities, along with number of industries and outlying residential in its suburb. At this stage, the integration of culture, retail business and bankers are found along with the university level education.

Megaloplis : When several cities and metropolises with each other forming a giant urban centre over a greater part of a nation than it is known as megalopolis. This is an urban area of material wealth, original art, varieties of business, industrial development and poly-nuclear city centres. New York, Boston, Philadelphia and Morrisville form a megalopolis on the eastern Atlantic sea coast of U.S.A.

Tyranopolis : In tyranopolis city countrywide urbanization pre-dominates the scene. Here the display and expense become the measurement of culture, standard of living and the expansion of trade and commerce of both national and international levels. Great Britain may attain this stage where about 90 per cent people are living in urban areas.

Nekropolis : It is known as ghost city or dead city. This stage may attained due to war, famine and diseases and the decline of municipal services, decay of cultural institutions and the relict features of towns give deserted look like the ancient Babylon. Nineveh. Vaishah, Mohanjodaro and Harappa. This is the last stage of the decline of urbanization.

In contrast, we have the invisible city, the product of revolution in communication and electric transmission. This has helped even the remote villages to have the urban component of life and hence we avoid the city where the degeneration of urban environment by slums and squattars and heaps of garbage disfavour sound human living. (Mondal, 2000) Doxiades has favoured the term *dynopolis* a city not for man but meant for cars, areroplanes, helicopters and rocket.

Development of Urban-Settlements

The oldest well-documented urban settlement is Ur in Mesopotamia (present-day Iraq). Ur, which means fire, was the settlement inhabited by Abroaham prior to his journey to Canaan, approximately 1900 B.C. (Rubenstin & Bacon, 1998)

Archeological expeditions have unearthed ruins in Ur that date from approximately 3000 B.C. The settlement was compact, perhaps one square mile, surrounded by a wall, and had a dense network of narrow winding streets and courtyards. The center of the settlement comprised a temple, royal palace, and cemetery. Residential areas, which surrounded the center, each had a temple.

Settlements can be found from the beginning of documented hisroty in at least four dirrerent locations - Mesopotamia, Egypt, the Indus Valley, and China. Settlements may have originated independently in each of the four areas, or they have dirrused from Mesopotamia. In the absence precise information, neither argument can be proved. From these four centers, the concept of urban settlement diffused to the rest of the world.

Europe : Urban settlements first reached Europe around 2500 B.C. The oldest settlements in Europe are in the eastern Mediterranean, including Knossos on the island of Crete, Troy in Asia Minor, and Mycenae in Greece. The settlements were trading centers for the thousands of islands dotting the Aegean Sea and the eastern Mediterranean.

The number of urban settlements grew rapidly during the eighth and sever; Lh centuries B.C., when hundreds of new towns were founded throughout the Mediterranean. The residents of one settlement would establish a new settlement elsewhere in the region. These new settlements filled gaps in trading routes and helped open new markets for goods. The settlements were organized into city-states- independent self-governing communities that included the settlement and surrounding places.

The diffusion of settlements through the Mediterranean can be documented. Greek city-states, including the cities of Comae and Syracuse, colonized Italy and Sicily between 750 and 700 B.C. Syracuse, in turn, colonized Massilia (Marseilles), France, about 600 B.C. During the sixth century, people from massilia founded settlements along the Spanish coast. (Rubenstin & Bacon, 1990)

Athens : The largest city-state of the ancient Greek world was Athens, probably the first city in history to attain a population of 100,00. The contribution of ancient Athens to Western civilization is substantial, especially in the arts and philosophy. Ancient Athens demonstrates that urban settlements have traditionally been distinguished fro rural life not only by economic differences but by a relative concentration of cultural activities.

Rome : The rise of the Roman Empire provided a further boon to urban settlement. With much of Europe, North Africa, and Southwest Asia brought under Roman rule, settlements were established to serve as military and administrative centers. Thade was encouraged by the construction of new roads and the security provided by the Roman army.

The center of the Empire, Rome had the largest concentration of administrative, commercial, and cultural activities and grew to a population of at least 250,000 inhabitants, although some observers claim that the population could have been as high as 1 million. Its centrality was encouraged by the communications pattern in the Empire : 'All roads lead to Rome,' according to the old saying.

Medieval Europe : The fall of the Roman Empire in the fifth century A.D. caused a decline in urban life. The Romans had provided stability and security for trade, permitting urban settlements to flourish. With the fragmentation of the Empire into the control of hundreds of different rulers, trade decreased, and the need for urban settlements diminished. Many Roman settlements were greatly reduced in population or abandoned altogether, and culture activities were transferred to monasteries and other rural retreats. (Rubenstin & Bacon, 1990)

Urban life revived in Europe beginning in the eleventh century. Settlements,

established by feudal lords for military reasons, contained residents who had agreed to fight for the lord in exchange for certain rights. The lord acquired defenders of his territory for less cost than the maintenance of a standing army; and the town residents escaped from the burden of rural serfs, who had to farm the lords land. The lord gave a charter of rights establishing the settlement as in independent city.

With their newfound freedom from rural serfs, the urban dwellers set about expanding trade. The surplus from the countryside was brought into the city for sale or exchange, and markets were expanded through trade with other free cities. By the fourteenth century Europe was covered by a dense network of small market towns serving the needs of particular lords connected to each other by other by roads and rivers.

Medieval City Patterns : The medieval town was a dense compact settlement, frequently surrounded by a wall. At the center was a public square for the market, surrounded by important public buildings, palaces, and churges.

The tallest and most elaborate structure was usually the church, and many of these medieval churches still dominate the landscape of smaller European towns. Because of the lack of space for construction within the walied settlement, ordinary shops and houses were erected against the side of the church. In monern times many of these modest buildings have been demolished, allowing people to appreciate the architectural beauty of the church. But this change does not afford an accurate image of the densely built medieval town.

Rapid Urban Growth

While permanent settlements have existed for thousands of years, rapid urban growth is very recent. Until modern times few settlements reached a population of more than a few thousand inhabitants. The largest settlements of the ancient world, Rome, probably had a maximum population of 250,000, or about the size of Des Moines, Iowa; St. Petersburg. Florida; or Albuquerque, New Mexico. Both Indianapolis and San Francisco are about triple the size of the seat of the vast culture of the Roman Empire.

The first urban settlement to reach a population of 1 million was London, around 1810. By 1982 approximately 175 cities in the world numdered 1 million. Approximately 40 percent or the worlds people now live in urban settlements, compared to only 3 percent in 1800.

Nature and Dispersion of Rural Settlement

The distribution of settlements must not be confused with the pattern of

settlements. The former, is concerned with the spread of settlements while the latter deals with the spatial relations between one dwelling and another. (Hudson, 1976)

The major patterns in rural areas, are (a) nucleated, composed of villages, (each more or less compact) and (b) dispersed consisting of single homesteads at some distance from each other.

An intermediate pattern, generally regarded as a kind of dispersal, is made up of scattered hamlets. The pattern may be complicated by the occurrence of both nucleated villages and scattered homesteads. Also, as times change, e.g. with improvements in technical efficiency or with the replacement of one agrarain regime by another, patterns are modified. In seeking to explain a pattern as it exists today, therefore, it is often necessary to recall the history of the area concerned. In general, a particular pattern may be related to local variations in relief, climate and soil fertility, to different methods of working the land, climate and soil fertility, to different methods of working the land, to diverse ethnic customs and traditions, to regional changes in the availability of water, and to the varying needs of defence. (Hudson, 1976)

In 1895, August Meitzen argued that the above two settlement patterns were early recognisable in western Europe" : the nucleated type, characteristic of which was the agglomerated village, and the dispersed type or Einzelhof, i.e. the isolated dwelling. He believed that each could be attributed to a particular agrarian regime : the nucleated village to communal cultivation as practised under the open-field system, and the dispersed homestead to individual cultivation. While this generalisation has some validity, Meitzen begged the question as to the motives which prompted fanners in some area (he instances most of Germany) to undertake communal agriculture while in others (notably France) they favoured a more individual approach to farming. He went on to aver that dispersion goes back to the Celtic mode of land occupation, nucleation to the spread of Germanic people (e.g. the Anglo-Saxons to England). Whatever the original pattern in Germany, France, England and other old countries was, it must be remembered that as land holdings have become consolidated into individual ownership there has been, at least in some areas; a measure of secondary dispersion or of intermediate (or intercalated) dispersion. (Hudson, 1976).

It has been claimed by some economic historians, in opposition to Meitzen, the the original unit of even Celtic settlement was the compact village; the isolated farmstead or hamlet resulted, albeit at an early period, from the break-up of nucleated settlements largely through the operation of inheritance laws. They agree, however, that primary dispersion is characteristic of most of the new, extensively farmed areas of the North American Prairits, Australian gress lands and Argentinian Papas.

FACTORS FAVOURING NUCLEATION

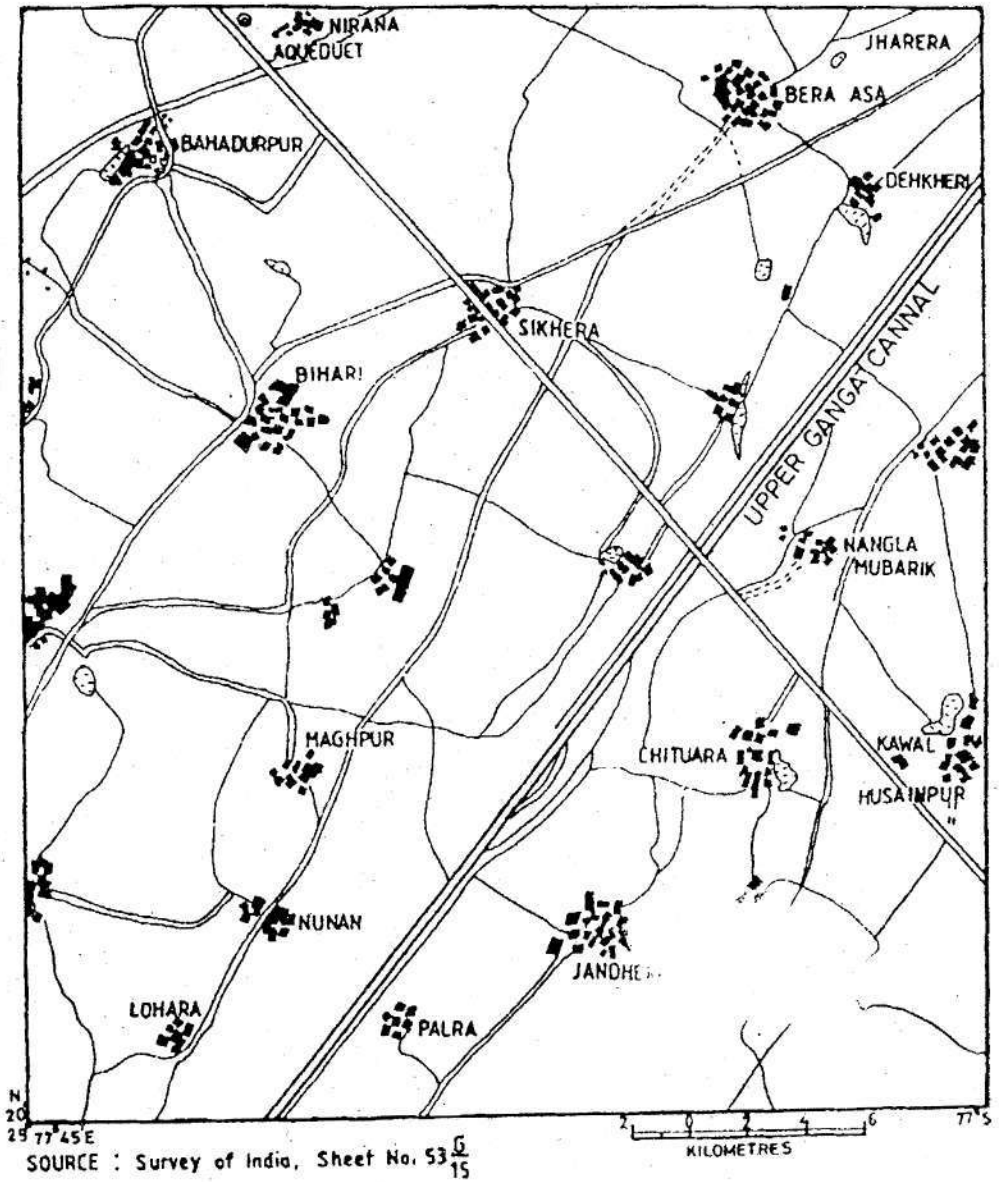
Man is a gregarious animal and to achieve very close social contiguity he may, prefer to inhabit a large communal dwelling. More usually, he chooses to live in a compact village or a town. In densely populated urban areas, nucleation takes an extreme form, and even in some rural areas people may live check by jowl, e.g. in the valleys of the Hanhramaut (southern Arabia), where dwellings often tower six to eight storeys high above the cultivated plots of the valley floor or in China, where as much as half the area of a village may be roofed over. (Hudson, 1976)

The practice of living in compact settlements was fostered among newly settled communities (e.g. the Neolithic cultivators of ancient Egypt and China, and the early Anglo-Saxon immigrants into Roman Britain) by the necessity of dealing effectively with a somewhat hostile environment, e.g. a forested or marshy landscape, and by the advantages of organising a permanent system of cultivation. In areas of fertile soil, such people could be in close touch with the fields which they worked and could also enjoy the social benefits of village life. Social advantages still exist : it is easier to obtain education and medical care, and easier to organise clubs and societies, in a nucleated village than in an area of dispersed settlement.

Certain land tenure systems and methods of organising labour lend themselves more than others to a nucleated pattern. The medieval open field system of farming, with its emphasis on communal field labour, clearly favoured nucleation just as much as certain modern systems, e.g. those established for ideological reasons in the Soviet Union, China and Istael. In the U.S.S.R., successive communist governments have aimed at maintaining full political control over the peasantry and at ensuring the prompt delivery of full agricultural quotas to the State. Their trust in the collective farming system as a means of fulfilling these purposes, boosted by the extensive use of motorised machinery, has perpetuated and emphasised the nucleated pattern of rural settlement already characteristic of Russia before 1917. Some Soviet villages, however, have smaller satellite settlements around them, chiefly devoted to pastoral farming. The people have no private possessions, and they live, eat and form communally, and share the total income. Many of these Jewish settlements are based on earlier defensive villages appropriate to a strongly united people clustering together for protection against external aggression. (Hudson, 1976).

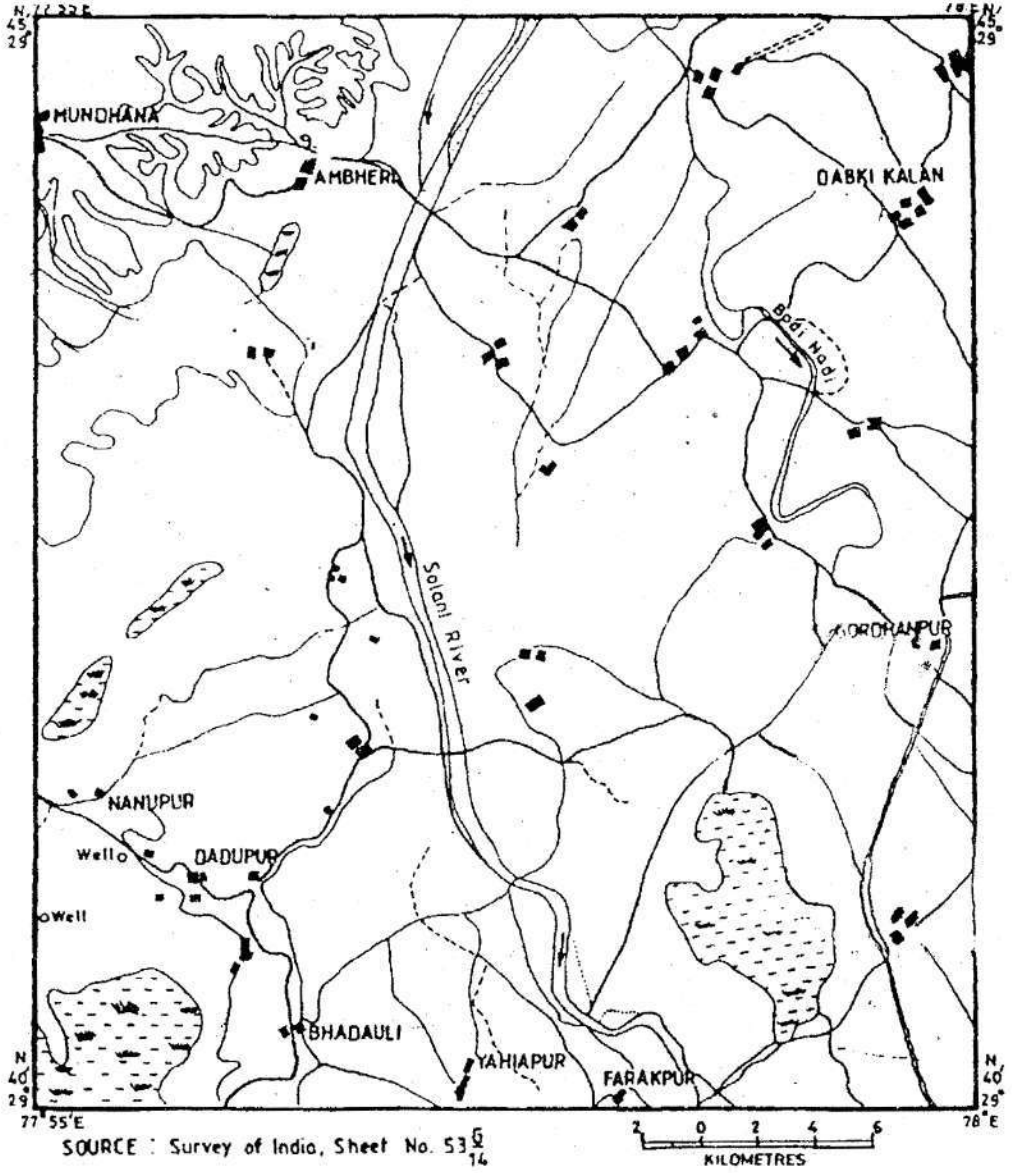
Nucleation, of course, has always had a defensive value, as is shown, for example, by the walled villages of the Hausa tribes in northern Nigeria, and the "acropolis" villages perched on hill summits in the Mediterranean coastlands, e.g. in Roussillon, at the eastern end of the Pyrenees.

Figure : Compact Settlements (District Muzaffarnagar, U.P.)



SOURCE : Survey of India, Sheet No. 53 G/15

Figure : Semi-Compact Settlements in the Khadar of Ganga River
(District Hardwar, Uttranchal)



Largely for protection against Indian attacks, the early New England colonists established themselves in large compact villages. During the Mau Mau uprising in Kenya in the 1950s, and at about the same time in Malaya (when Communist guerrilla activity was rife) and in Algeria (during the independence struggle), many people who had previously inhabited isolated farms and scattered hamlets sought out the sanctury of villages. (Hudson, 1976)

A nucleated settlement pattern is also the obvious response to certain types of physical environment. Where water is scarce and hard to get, for example in deserts where deep wells may have to dug for drinking water and cultivation, compact villages generally result.

Trends from dispersion to nuclation are becoming evident near large cities and conurbations and along much-used motor roads where urban sprawl is devouring agricultural land and traffic growth is promoting ribbon settlement. Thus many erstwhile farmsteads and country hamlets are being incorporated into dormitory villages or else becoming part of the expanding township.

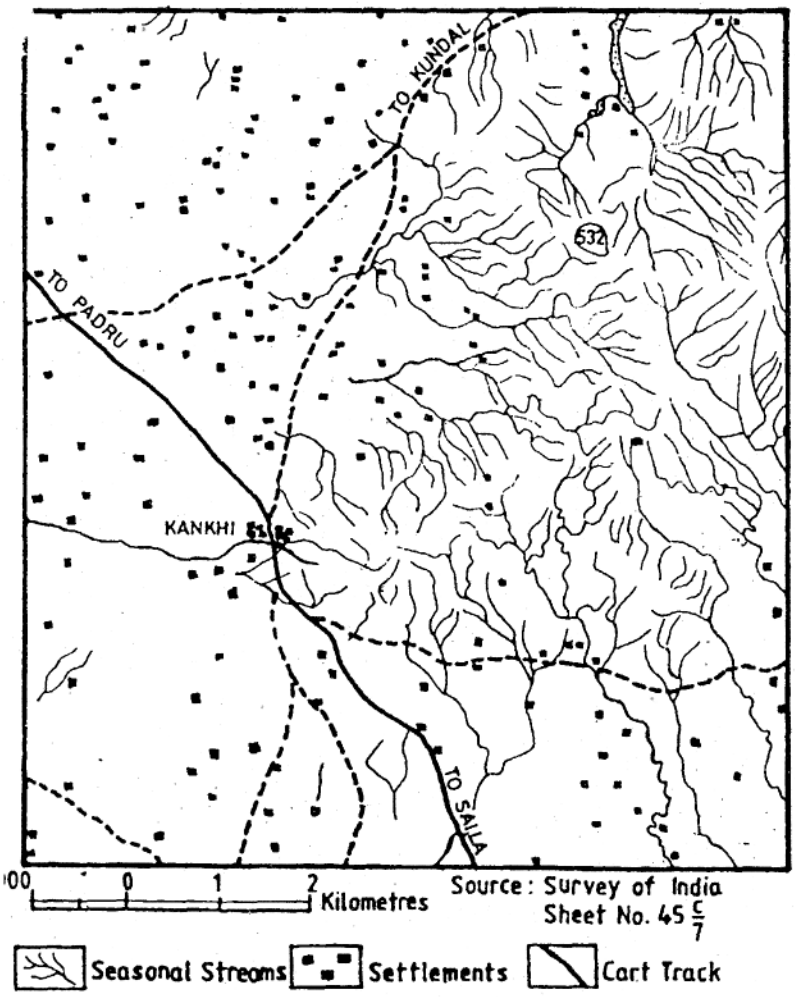
FACTORS FAVOURING DISPERSION

Dispersed settlements are normal in many unrewarding highland and forested areas, such as the Vosges, Black Forest, where agricultural opportunities are limited by a difficult terrain, a harsh climate and sterile soils. Uplands suited to little but sheep-rearing or extensive cattle-raising usually fall into this category : some of the flocks and herds would be too far from the stockman's home if it were in a village, and the value of the agricultural product is not enough to support a large community. In such areas, the Pennines and Welsh Highlands and in parts of Norway dispersed settlement-where any settlement exists at all - is a common feature.

An area where water supplies are virtually ubiquitous, may show a dispersed pattern. This is certainly the case in West Bengal, where there is a very high population density and the pattern, though dispersed, is very close. It is also true of parts of south-west Aquitaine and Kent (where some historians have attributed dispersion primarily to the land-holding system), off most of northern Belgium, and of many irrigated areas. But in Hungary, where water is also abundant, nucleation in the form of very large villages is characteristic. (Hudson, 1976)

Fertile lowlands in many of the newer parts of the world are marked by a dispersed settlement pattern, especially where they are devoted to extensive farming. In these regions, mainly temperate grassland, the use of barbed wire and wind-pumps has allowed farmers to live in isolation. Individual initiative has long been a powerful motive for dispersion, for example the desire of most pioneers to "get away from it

all", whether "it" is religious or ethnic persecution, the law or social incompatibility. There exists also the chance of improving one's living standards by raising crop yields and introducing new crops and new methods.



Much human initiative was released in older countries when serfdom disappeared and when there was still plenty of forest to be cleared and commons to enclose. In England, under the Tudors, many small holders began to erect their own isolated farms in the centre of the lands newly consolidated following the break-up of the open-field system and its scattered stripholdings. The same happened at about the same time or later in parts of Germany, Sweden and Denmark.

The advent of settled, peaceful conditions, and their continuance over a comparatively long period, allows people to disperse more safely over the countryside, especially if communications are improved at the same time and the marketing of

surpluses is thereby facilitated. There is, in fact, a growing tendency in many widely separated parts of the world for farmers to scatter over the rural landscape at the same time as more and more rural dwellers are flocking into the large centres of nucleation (i.e. the towns and cities), even though dispersal entails sacrificing the social amenities of a village and paying more for the provision of roads, electricity and wat r. Thus, in an attempt to raise peasant living standards in the parched, poverty-stricken southern parts of Italy, the Italian Government has shouldered the task of establishing smallholdings which poor families are now working intensively without hired help. In these newly planned areas, irrigation facility have been extended and the scourge of malaria, which was a main cause of previous neglect, has been eradicated. Moreover, it is to be hoped that the need for nucleation on defensive grounds has now gone. (Hudson, 1976)

In Egypt, the old "basin" form of irrigation has largely given way to a perennial system, and the peasants (fellahin) have now been given the right to own land. Therefore in this country, too, more dispersed farm steads are being established. In Mexico and many other parts of Latin America, likewise, the break-up of large estates and the promulgation of agrarian reform laws are encouraging dispersion.

THE MEASUREMENT OF DISPERSION

The words "dispersion" and "nucleation", like the words "village" and "hamlet", have no precise connotation, though several statistical methods of measuring the degree of dispersion or concentration have been suggested. B. M. Swainson, for example "Dispersion and Agglomeration of Rural Settlement in Somerset," Geography), has computed the percentage of the population of Somerset living in the following house groupings : 1, 2-5, 6-10, 11-20, 21-50, 51-100, 101-200 and over 200. He is able to say how dominant each group is in each part of the county. In France, it is possible to adopt as a basis for calculation not the number of houses, nor the varying density of settlements, but, more satisfactorily, the number of people inhabiting each unit. The French census distinguishes for each commune the population of both the chef-lieu and the rest of the commune. Demangeon was therefore able to suggest the following co-efficient of dispersion :

$$C = \frac{E \times N}{T}$$

where C is the co-efficient, E is the population of the settlements outside the commune centre, N is the number of settlements excluding the chief one, and T the total commune population. Unfortunately, this formula is not very helpful outside France, and is useless in England.

3.3 HIERARCHY OF RURAL SETTLEMENTS

Rural settlements are characterised by primary occupation, extensive land use pattern, low density of population, slow and old means of transport and communication, poor economic development, traditional way of life, greater spirit of co-operation and less polluted environment. These settlements are smaller in size. They are sub-divided into (i) farm steads, (ii) hamlets, and (iii) villages on the basis of their size, morphology and function.

Of these farm stead is the smallest unit of rural settlement consisting of a small building of one or two rooms in agricultural lands.

Hamlet is a small village which may be an outgrowth of the main village to shelter new immigrants within the boundary of the revenue village. It has strong socio-economic link with the main village.

A village is an ideal and well-knit unit of rural settlement which has a definite social entity. It is characterised by relative homogeneity, informality, prominence of primary groups, lesser density of population and agriculture as the main occupation.

CLASSIFICATION OF VILLAGES

Although there are sereral ways of classification based on size, population and area of land is the most popular and accepted classification of villages. On the basis of this criteria, following classes of villages are recognised. (Khuller, D.R., 2006, India).

1. Pura : The place where a habitat had been in ancient days and where chief habitats are all around or nearby areas is called *pura.* This habitat can thus be called the nucleus of the area. In agricultural areas solitary habitats generally became "puravas" which under favourable circumstances grow into villages.

2. Khas : The word *khas* is used for the main village or sadar. Sometimes people of the main village settle at some distance and call this new village after their main village. When the population increases, the word *khas* is used for the village from where people spread around.

3. Kalan : The word *kalan* is used for large villages and used at the end of the name of the village i.e. Bound Kalan. People of several classes and castes live in such villages.

4. Khurd : The word *khurd* is a degraded form of the urdu word *barkhurdar* (meaning son or small). Therefore this word is used for small villages i.e. Dumarkha Khurd.

5. Khera : This work is used for small colonies and also for the higher land of the village. *Khera* has great social value for the village community because almost all the shows such as Ramlila, Nautanki, etc. take place here. In some areas the word khera is used places where the ruins of an ancient fort are found.

6. Nanglay : It comprises a group of small villages where one village is surrounded by several satellite villages. (Khuller, 2006)

(Cycle of Urban Development and Urban Hierarchy)

The origin, growth and stage of an urban settlement favours its cyclic character. Whetner it is a hamlet or a village, the availability of tertiary activities adds an urban character in it. Hence, the size of service centres ranges from roadside to ecumenopolis, a stage of world urbanization. Some of these terminologies are very loosely defined but some are very precise.

Roadside

A roadside is an isolated housing unit of gasoline station, petrol pump, betel shop or tea stall etc. situated along a highway. The owners of such units either reside in the same house or on the first story, as the situation may favour. Roadside settlements are found especially in India, U.S.A., Canada and European countries along the lines of high traffic. This is the initial stage of urban settlement growth.

Hamlet

A hamlet is larger in population size than a roadside and consists of a few buildings some of which are residential and some commercial. One of the major factors in the origin of a hamlet is the presence of a motel and few permanent residences of businessmen.

Village

A village is still larger in population size (150 to 10,000) and acquires a variety of functions such as daily retail market, high school, dispensary, post office, electricity and nodal point for different modes of local transport. It comes under the primary and secondary service centres.

Town

A town is a place having a municipality or an administration of a notified area committee. The population may range from 2,000 to 20,000 and it may have predominance of tertiary functions, e.g., shopping, transport, house renting and store house of various items along with a wholesale grain market. It may be a centre for Anchal Headquarter, teleplone exchange, college and railway station as well.

City

In case an urban centre acquires a population of more than 1,00,000 than it is known as a city. This criteria has been adopted by the census of India. It acquires diversified functions such as administrative, business, education, transport, industrial and religious, etc. and different nodes of business area may be identified and it must be a railway junction or perform a university level service.

Conurbation

In a conurbation cities coalesce with each other due to expansion of industries and grow together economically. Politically it may be independent, viz, Mumbai and Thana constitute an urbanized cluster but they are independent from the point of view of administration.

Metropolis

According to the census of India an urban centre having 1,000,000 of population is known as metropolis. Hence, the term millionaire city is self-evident. The 2001 census of India showed that there were 35 metropolis in the country and about 150 in the entire world. It is known as a cosmopolitan city.

Megalopolis

This term has been used for the most massive concentration of urbanized settlement on the Atlantic Sea Board of North America over a stretch of 900 kilometres from Boston in the North upto Florida in the South. It resulted obviously from the coalesce of chain of metropolitan areas, each of which grew around a substantial urban nucleus. The super metropolitan character of this area and its urban growth ever observed earned it a special name megalopolis given by Jean Gottmann.

Tyranopolis

When the whole country is urbanized than it any be called tyranopolis. Until now this situation of urban development has not aroused throughout the world but the increase of urban population of Great Britain, Germany and U.S.A the spread of tyranopolis by 100 per cent urban development is not very far.

Ecumenopolis

This is the stage of world urbanization. Near about A. D. 2050 the world may pass through this last stage of urban development and people will get food from ocean which covers about 78 per cent area of the blobe.

Classification of Towns by Population

In terms of population, towns have been classified into : Small towns, major

towns city and metropolis, as shown in table below. These classifications are made on the basis of number of inhabitans in an urban centre and their density per square kilometre. Towns having a population below 50,000 are called small towns; and

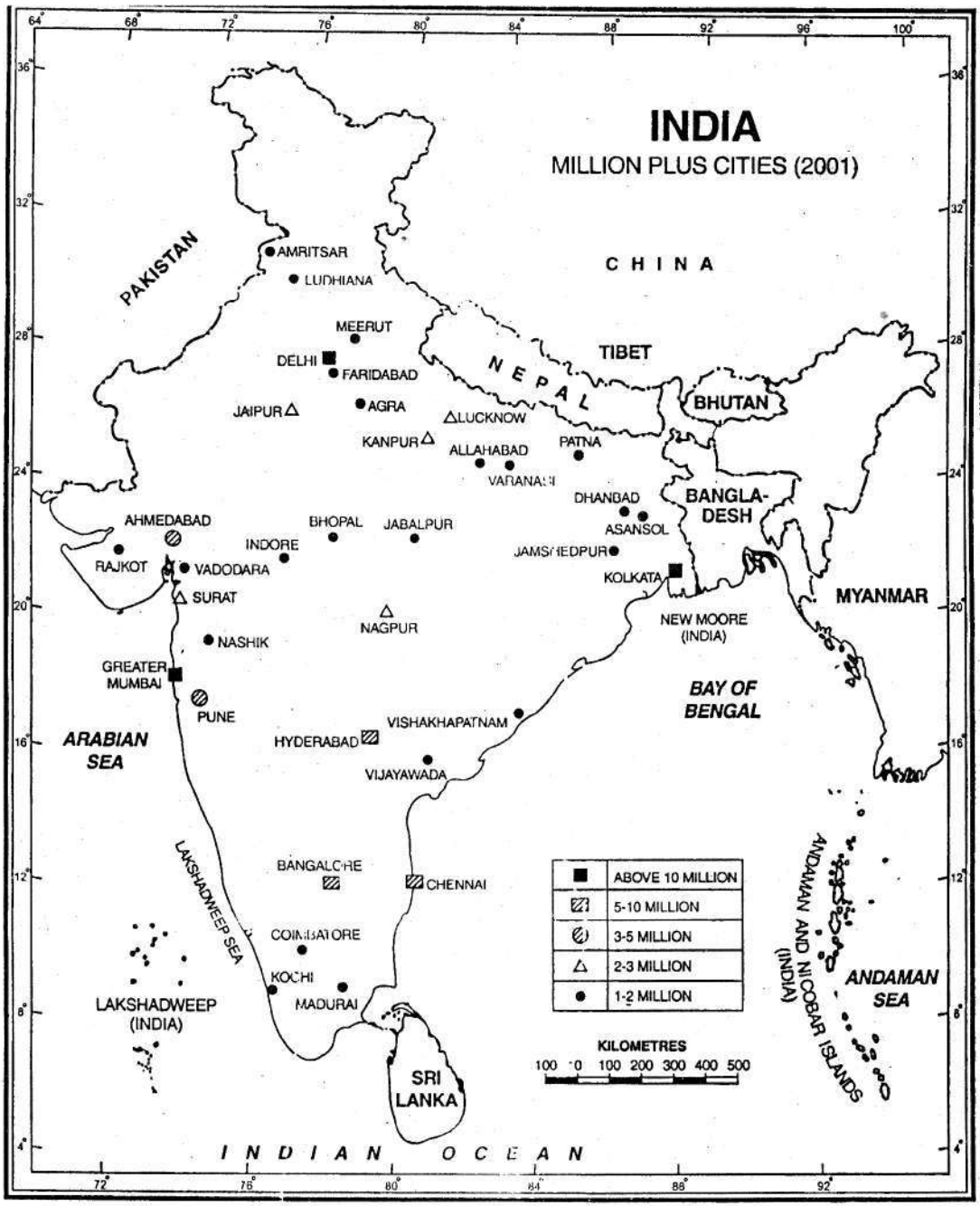


FIG. India : Million plus cities

those whose population ranges from 50,000 to 99,999 are called major towns. A city has above 100,000 inhabitants, and a metropolis has a population of 1,000,000.

3.4 METROPOLIZATION (OR METROPOLITANIZATION)

A metropolis is a distinct form of settlement, characteristically with sprawling of its built-up area and includes its inter-dependent nearby villages and even towns. The metropolitan centres are a class by themselves, characterized by large scale consumption and a large quantum of flows of people, goods., services and information (Prakasa Rao, 1983, Unbanization in India : Spatial Dimensions).

When does a city qualify for the title of metropolis ? The population aggregates employed by statisticians and others are of limited use to designate city character generally, and the status of a city as a regional capital cannot be measured from the number of its inhabitants. The 100,000 and million figures and often used to indicate respectively 'large cities' and 'super-cities', or what have been facetiously called 'millionaire cities'. It is normally a political capital, though New York is a great exception, far larger in population than any other city in the country. Apart from mere size, one must look for independent institutions for art and education, and for leadership in ideas. There is a grading in the importance of cities as regional centres of this kind and only a few come into the top category as full-fledged metropolitan centres. On the other hand, the larger the city agglomeration and the greater the density of population in its environs the more effective will be its impact on the surrounding area and the closer the integration of the city and its environs. (Dickinson, R.E., 1964)

American economic historian N. S. B. Cras has nicely pointed the economic base of the metropolitan city. In his words the highest grade of city which serves as an putstanding centre of human affairs is termed an economic metropolis ; the area which is dependent on it, metropolitan economy. According Cras, metropolitan economy is 'the organization of producers and consumers mutual dependent for goods and service wherein their wants are supplied by asystem of exchange concentrated in a large city, which is the focus of local trade and the centre through which normal economic relations with the outside are established and maintained' Cras further goes on to say that. A city becomes metropolitant 'when most kinds of products of the district concentrate in it for trade as well as transit; and when the necessary financial transactions involved in this exchange are provided by it'. Such a city will have a population considerably larger than that of surrounding towns; it will be an independent

centre of trade, with a large variety of regional indristries and a large wholesale business; it will be a financial centre; and finally, a cultural and administrative centre. (Quoted from Dickinson, 1964)

According to R. Ramchandran (1995), "Metropolization is essentially a product of the centralization of administrative, political and economic forces in the country at the national and state capitals. Metropolization is also a product of intense interaction between cities and .he intergration of national economy and urban centres into a viable interdependent system". The pace of metropolization depends upon the rate of direct migration of rural folk to metropolitan cities as well as from the smaller towns.

How metropolization spreads ? Dickinson (1964) mentions that the dominance of the economic metropolis is a basic feature of the organization of modern society, since it arises from that geographical specialization fuction which is rooted in cheap and rapid transport. Moreover, the great complexity of our modern civilization brings to the city a further variety of functions which is performs for farms, factories, and people around it. Metropolitant economy is a universal feature of modern civilization. It is modern civilization. In the past, metropolitanism was confined to a few cities. Today many cities formerly tributary to the older metropolises are becoming increasingly independent of them.

American sociologist, R. D. McKenzie has succinctly summarised metropolization in the following lines. In his words "The metropolitan (or city) region thus considered is primarily a functional entity. Geographically it extends as far as the city exert a dominant influence. It is essentially an extended pattern of local communal life based upon motor transportation. Structurally, this new metropolitan regionalism is axiate in form. The basic elements of its patterns are centres, routes and rims. The metropolitan region represents a constellation of centres, the interrelations of which are characterized by dominance and subordination. Every region is organized around a central city or focal point of dominance in which are located the institutions and services that, cater to the region as a whole and integrate it with other regions. (Quoted from Dicknson, 1964)

Megalopolis

Originally designating the seaboard of the USA from Boston to Washington, this is now any many-centred, multi-city, urban area of more than to million inhabitants, generally dominated by low-density settlement and complex networks

of economic specialization. It is usually formed by the coalescence of conurbations (*Oxford Dictionary of Geography*). "A Megalopolis is only a connurbation which has grown to giant proportions" Beaujeu Garner.

The phenomenal expansion of urban land uses around and between the central cities writes Dickinson, has not merely resulted in the growth of conurbations, but also in the coalescence of such areas to form predominantly urban regions in which cities compete with each other in the extension of their functional orbits. This is particularly true in case of eastern U.S.A.

The great cities, continues Dickinson, are expanding on their peripheries

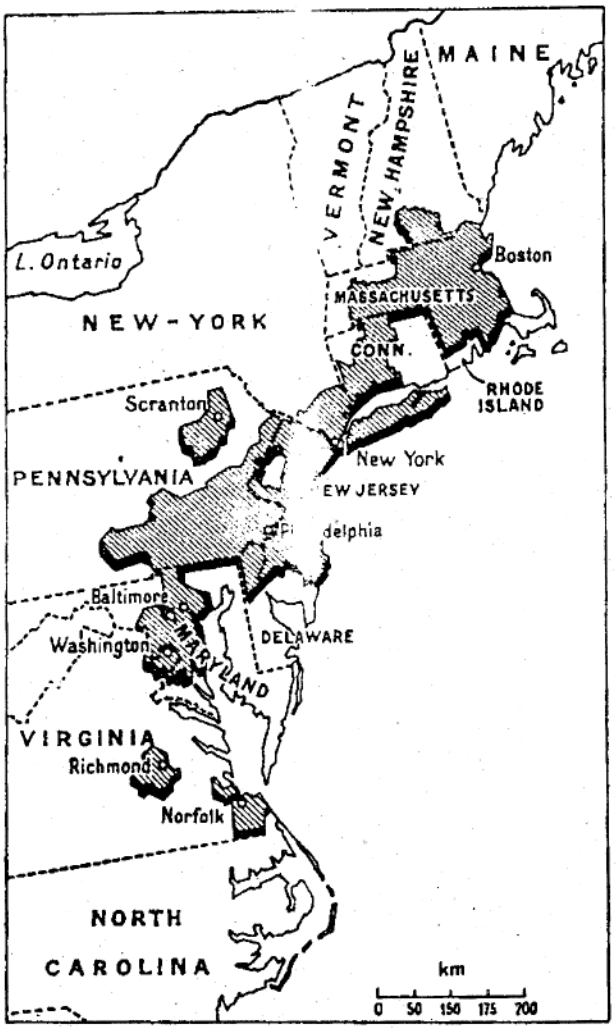


Fig. Megalopolis in North Eastern Seaboard in U.S.A.

at a phenomenally rapid rate. The urbanized areas are spreading to the boundaries of the S.M.A.s and even beyond them.

The most obvious feature of the distribution of these metropolitan areas is the great stretch of almost continuously urbanized land which extends a distance of over 600 miles from Portland in Maine to Norfolk-Newport News in Virginia.

There are open spaces, of course, but they are rapidly being filled up, and all parts are drawn closely into the functional orbits of the major places of work. The farmsteads in the rural islands are lived in today by professional people, factory workers, and others who travel daily to their plants and offices. For here and elsewhere, growth takes place most rapidly along the highways. Miles of ribbon development - bill-boards, cafes, hot-dog stands, drive-in theatres, amusement parks, petrol stations, and even specialized stores - herald the approaches to every city. (Dickinson, 1964)

Now, let us see what were the causes behind such extensive urbanization in this part of U.S.A. Beaujeu Garneer writes that the urbanisation developed here under very special, exceptionally favourable conditions. Many of the towns are ports. They have benefited from a massive influx of immigrants from another continent ; but they did not tie these people to the immediate vicinity ; on the contrary they populated the surrounding countryside, and throuth them the entire country became colonised. Megalopolis arose from the conquest of the American continent, which developed under its direction. The power of America is concentrated there. The development of the whole country has benefited Megalopolis, in the course of 150 years of industrialisation, general prosperity and continuous expansion.

MEGALOPOLIS IN OTHER PARTS OF THE WORLD

Even without such exceptional conditions, other conglomerations like Megalopolis seem already to be forming. They were not caused in the same way as the megalopolis of America. (Beaujeu Garneers) In the Rhenish-Westphalian region it was the presence of coal which allowed the parallel development of several towns with populations of over 100,000 and with an uninterrupted series of towns from Krefeld to Hamm, north of the river Ruhr. Round the Pennine uplands, with Manchester, Birmingham and Leeds, there is a similar U-shaped cluster of towns, developed frorn the outer fringe of the Birmingham conurbation to the agglomeration of London and which was formed under very different circumstances.

Commerce on the one hand and industry founded on coal on the other have given rise, from Flanders to the Netherlands, to groups of towns which are showing a tendency to join across frontiers and which are already extending tentacles towards the Ruhr and the agglomeration of Paris.

A similar group is taking shape round the Japanese Mediterranean in the Hanshin region from Osaka to Kobe where about thirty cities are grouped around the Bay of Osaka.

Almost everywhere towns are expanding and multiplying. They concentrate in places where they can take advantage of the same favourable conditions and the area becomes organised as a polynuclear conurbation. (Beaujeu-Garneer, 1967)

3.5 WORLD DISTRIBUTION OF RURAL SETTLEMENTS

Asia

Rural settlements around farms is the characteristic feature of the greater part of Asia. Except small areas, such as Hokkaido, the northern island of the Japanese group, isolated farm steads are rare. Throughout the southern islands of Japan, and Pakistan, close-set compact hamlets arid villages are found throughout the intensively cultivated plain lands,

On through the near East, as in the lowland of the Tigris and Euphrates rivers, and into Africa as in the valley of Nile, the rural agglomeration persists almost exclusively.

Israel shows a Strong preferenee for cooperative organization in its rural Areas. Various forms of such organization constitute the basis of the four types of rural settlements found in the country namely the Kibbutz, the Moshav, Shitufi and the Moshava (Mandal, R. B., 1989 : **Systems of Rural Settlements in Developing Countries).**

In the **Kibbutz** everything is collectively owned by their members except the land, which is the national property. The basic principle is that every member should give to the community to the best of his abilities, and take the share from it according to his needs.

Genera! by the largest Kibbutzim have been attained in settlements having a population of 1500 to 2000.

The **Moshav** is a small holder's settlement in which, although each settler works on his separate plot of land, lives in his own household and draws income from his farm's produce. Moshav villages range in population from 150 to 900.

The **Moshav Shituji** is a co-operative small holders village where production is carried out communally (as in the Kibbutz). Here family life is self contained population not exceeding 400 inhabitants

The **Moshava** is a village of the regular European type where land, buildings fanning installation and so on are all privately owned and the co-operative organizations are relatively weak. The moshavot (plural of moshava). Contain 20,000 to 70,000 people.

Africa

The majority of people (85%) in the continent of Africa live in rural settlements of small hamlet and permanent nucleated villages. A collection of number of households constitute a village which may be of various sizes. There are some tribes such as tuareg. Futani and Masai who lead a nomadic life in temporary settlements.

The compact rural settlement is found throughout Africa from forests and hill slopes to grassland because it helps in traditional block - farming system. Sometimes villages are surrounded by walls of clay for the purpose of deference from wild beasts and enemy. In the marshy areas of the Niger delta, the shores of lake Chad and in the inland delta region of Mail compact rural settlements are found in areas above seasonal flood margin (Mandal, R. B., **Systems of Rural Settlements in Developing Countries).**

In Africa dispersed rural settlements are associated with the Tonga people of Zimbabwe, the Tiv people or Middle Benue valley in Nigeria, the Ibo people of Iboland, Nigeria; the Mossi of Upper Volta and Wolof of Senegal. The available evidence suggests that in all these areas dispersal is a secondary form of settlement resulting from disintegration of nucleated rural settlements. In areas of scarcely available farmland a meausre of security is found in individual land ownership, the people have tended to move out to build on one of their farm piots. Further, the stabilization of village boundary and the creation of forest reserves resulted in land shortage, and this accelerated the emergence of individual iand tenure and the dispersal of rural settlements. In this process even nucleated walled villages were relocated on more accessible sites on the nearby plains as in Shemdam Division of Nigeria.

In Ghana compounds are circular, built of locally obtained clay, usually in the form of several round hutments joined by an encircling wall, and vary in size according to members in a family. The mud and wattle buildings, can be permanent; they are abandoned only when there is more trouble to repair that to re-build. New compounds are usually built in the vicinity of old and the same area of land being subject to cultivation. (Mandal, R. B., **Systems of Rural Settlements in Developing Countries).**

In Ghana, all permanent rural settlements are nucleated, but vary in type in

different parts of the country. Settlements associated with shifting cultivation are, of course, temporary, being constructed of wattle mud and thatch.

Europe

The hamlet or village is the characteristic settlement unit throughout most of the southern and eastern Europe. Even into the western part of Europe it continues as a prominent form, but the disseminated pattern becoming more and more prominent as one proceeds north westward. Yet even in north western Europe a thin scattering of rural population fails to cover up the basic nucleated pattern.

South and United America

The whole of South and Middle America's into Mexico, agglomeration is the rule, but in North America, and especially in the United States, it is virtually absent in favour of isolated rural settlements.

North America

In Colonial days, the United States followed the European tradition of rural agglomeration but the need for protection in a wilderness also lent strength to the tradition.

In United States a land survey system was established for the public lands in the interior and later the same extended throughout the west. This system provided a framework within shich a disseminated rural settlement pattern developed. In this regard large farms and roadways helped to bring about a settlement pattern in USA where form houses and buildings are disseminated rather than agglomerated. As settlement spread into the drier west, larger acreages were allowed for homesteading, so that farms came to be spaced more widely. Mechanization of agriculture and advancement in transportation have likewise tended to increase dispersion.

Canada in an area of scattered rather than chistered rural population. So also are most of Holland, Australia and New Zealand, the areas of European colonization in South and East Africa, and some parts of South America. The pattern of agglomeration has been lost in these areas. (Mandel, R. B., **Systems of Rural Settlements in Developing Countries).**

RURAL SETTLEMENTS IN INDIA

India is a country dominated by rural settlements. Its 74.3 per cent of total population (1991 Census) lives in 5,80,781 villages. These settlement occupy flood plains, river banks, natural levees, hill slopes, valley bottoms, piedmont areas, water points, flat hill tops and spurs and coastal lands. In India the average areal size of a village is 5.71 sq. km which inhabits an average population of 1082 (1991 Census).

Pondicherry (1.9 sq.km). West Bengal (2.31 sq. km), Uttar Pradesh and Bihar (2.6 sq. km) are characterised by small areal size of villages. On the other hand Jammu and Kashmir (34.2 sq. km), Mizoram (30.2 sq. km), Kerala (28.1 sq. km), Arunachal Pradesh (22.9 sq. km), Andaman-Nicobar islands (16.4 sq. km), Sikkim (15.9 sq. km) and Nagaland (13 sq. km) house large areal size of villages. Looking from the point of view of population-size of less than 1,000. On the other hand there are only 23 per cent of the villages in the country whose population-size in more than 5,000. Kerala, Tripura, Tamil Nadu, Goa, Haryana and Andhra Pradesh generally have large population-size of villages. (Tiwari, R. C., 2004, Geography of India)

The average village-density is 18 villages per 100 sq. km of area for the country which varies from a minimum of 3 in Mizoram and Jammu and Kashmir to a maximum of 53 in Pondicherry and 43 in West Bengal. There are 8 states (West Bengal, Bihar, Uttar Pradesh, Assam, Orissa, Himachal Pradesh, Punjab and Meghalaya) and 4 union territories (Pondicherry, Lakshadweep, Chandigarh, Daman and Diu) in which the density value in more than 20 villages per 100 sq. km of area. On the other hand in equal number of states (Mizoram, Jammu and Kashmir, Kerala, Arunachal Pradesh, Sikkim, Nagaland, Tripura and Gujarat) the density value of villages is less than 10 villages per 100 sq. km of area.

The rural population density (average 191 persons/sq. km) also exhibits great variation at statelevel, its value fluctuating from a minium of 9 in Arunachal Pradesh to a maximum of 706 in Lakshadweep. There are nine states (West Bengal, Kerala, Bihar, Uttar Pradesh, Punjab, Tamil Nadu, Haryana, Assam and Tripura) and all the union terrtories (except Andaman-Nicobar islands) which indicate higher value than the national average (191). In equal number of states and one union territory the rural population density averages are less than 1 00 persons per sq. kimometre. These are mainly characterised by hilly terrain, plateau topography and arid climatic conditions. High density areas of rural population mainly occupy the alluvial lands of the Ganga plain and coastal areas.

(1) Rural Settlement in the Himalayas

Three types of settlements are found in the Himalayan region : (i) hamleted or semi-sprinkled, (ii) dispersed or sprinkled, and (iii) isolated homesteads. The first type mainly occupies low lying valleys with regular stretch of fairly level land. Similarly the second type is found in patches while the last type occurs on high elevations. Such settlements are generally found in Himachal Pradesh and Jammu and Kashmir. In Jammu and Kashmir the smaller villages are generally nucleated, while the larger ones are dispersed. A special feature of Kashmir valley is the spring settlements. In the Kashmir Himalayas of Uttaranchal undulating relief, cold climate,

paucity of agricultural land, subsistence farming, horticulture and cattle grazing have favoured the growth of small dispersed settlememts. These are divided into permanent, seasonal and mobile settlements. With terraced fields above and below spurs provide the most common sites for village settlement. Others are located in valley bottoms near the perennial springs and water bodies. Some localities like the valleys of Mana, Niti and Janhavi rivers have developed twin village settlements : (i) summer settlements (Malla gram) at a height of 2700-5000 metres, and (ii) winter settlements (Talla gram) at low altitudes (below 1800 meteres).

In the eastern Himalayas the settlements are small and widely dispersed due to steep slope, undulating topography, heavy rain fall, dense forest cover and multiplicity of tribes with different dialects and rituals. Here compact and well organised villages are found in the northern zone of Indo-Tibetan culture ; the lower zone exhibiting Assamese impact ; and the middle zone characterised by dispersed settlements. In Meghalaya, Khasi villages are located along the hill slopes near the water bodies which range from isolated homestead to dispersed and composite settlements. In Nagaland villages generally occupy flat tops of the hills, spurs and gentle hill slopes between 1200-2100 m of height and consist or 20-100 houses. In Hanipur Kukis practising shifting farming build their temporary houses on flat topped ridges. Lushai tribes of Mizoram build their linear settlements in valleys and on the flat-topped hills. (Tiwari, 2004).

(2) Rural Settlements in the Northern Great Plains

Northern Great Plains of India present a mixture of settlement types and pattern. Rural settlements in the Rajasthan plain are small, compact and sparsely distributed owing to the limited water supply distributed owning to the limited water supply and cultivable land and problem of security. In excessive arid areas of Banner, Jaisalmer and Bikaner, where there is predominance of sanddunes, hamleted settlements are noticed near the water-points. But in the eastern and north-western parts of Rajasthan large compact villages are common sight. India canal is encourging compact and permanent villaves sililar to the Punjub plains. In the canal irrigated areas of Punjab plains the villages are uniformly spaced, compact and generally circular in form. But in the flood prone areas of the Ravi river we find widely spaced small sized rural settlements.

Over the Upper Ganga Plain almost 55 per cent of the population lives in medium-sized villages. In the Rohikhand Tarai areas settlements are unevenly distributed due to high percentage of forests, marshy lands and seasonal floods. Here villages are mostly hamleted located at river bluffs and river embankments. In the areas of older alluvium (Bhangar) the settlements are compact and closely packed. (Tiwari, 2004)

On the Middle Ganga Plain the distribution and pattern of rural settlements are

largely influenced by alluvial morphology. Areas of east Uttar Pradesh and west Bihar are marked by small sized but closely spaced villages. Hamlated settlements are typical of the Ganga-Gharghara doab. The Mithila plain exhibits wide variation in settlement pattern and types : linear in the lower Gandak valley, dispersed in the sub-montance tract of Champaran, relatively dispersed in the Ganga-Burhi Gandak doab, and irregualarly scattered or linearly oriented along the levees of dead channels or ox-box lakes in Purnea. The south Bihar plain has more compact settlements than its northern counterpart.

In the Lower Ganga plains hydrological characteristics have dominant role in determining their types and patterns. Here scattered villages are very common in the Rahr plain, Duars and Sundarbans ; compact settlements abound in the Ajay-Damodar Brahmani interfluves and hamleted ones dominate in the Bhagirathi-Dwarka interfluve. Linear pattern is apparent along the coast.

In the Brahmaputra valley villages are generally agglomerated, aligned along the river levees and transport arteries. Here villages are smaller in size in which houses are separated by bamboo fences. Machan type of houses on wooden pillars are constructed in low-lying and flood-prone areas where boat in the only means of transport during rainy season. (Tiwari, 2004)

(3) Rural Settlements in the Peninsular India

Rural settlements in the Peninsular part of the country exhibit mixed types depending upon the economic development. Throughout the hilly tract of the Aravalli region huts are widely dispersed within the revenue village lands. In the dissected hills fo Mewar, Marwar and Alwar isolated farm steads are dotted in the long narrow valleys. Tonk, Sawai Madhopur, Bundi, Jaipur districts and the Banas valley region are characterised by compact to semi-compact settlements. Sirohi district and plateau area around Udaipur are abound with isolated, dispersed and widely apart settlements.

In the highly dissected and riverine tracts of Bundelkhand large compact villages occupy the favourable and protected sites, while badlands are marked with semi-compact and dispersed settlements. Malwas region, owing to its fertile soils, has helped in the growth of large clustered settlements. But rough terrain around Sagar has favoured the growth of semi-dispersed and dispersed settlements.

The Chotanagpur plateau region shows great variation in the types and patterns of rural settlements. Here Rajmahal highland, Ranch Pargana and Dal bhumi are characterised with clustered type ; Ranchi plateau, Hazaribagh plateau, south-eastern Damodar basin and Panch Pargana with semi-clustered type; the Kolhari highland, outer eastern part of the Ranchi plateau, Pat area, northern Koel basin, southern part of Hazaribagh plateau and south-eastern part of Rajmahal highlands with hamleted type; the Porhat-Dalma highland and Sigdega with semi dispersed; and the Kolhan highland area by dispersed type of settlements (Sinha, V.N.P., 1976, p. 72.

PREFACE

In the curricular structure introduced by this University for students of Post-Graduate degree programme, the opportunity to pursue Post-Graduate course in any subject introduced by this University is equally available to all learners. Instead of being guided by any presumption about ability level, it would perhaps stand to reason if receptivity of a learner is judged in the course of the learning process. That would be entirely in keeping with the objectives of open education which does not believe in artificial differentiation.

Keeping this in view, the study materials of the Post-Graduate level in different subjects are being prepared on the basis of a well laid-out syllabus. The course structure combines the best elements in the approved syllabi of Central and State Universities in respective subjects. It has been so designed as to be upgradable with the addition of new information as well as results of fresh thinking and analysis.

The accepted methodology of distance education has been followed in the preparation of these study materials. Co-operation in every form of experienced scholars is indispensable for a work of this kind. We, therefore, owe an enormous debt of gratitude to everyone whose tireless efforts went into the writing, editing, and devising of a proper lay-out of the materials. Practically speaking, their role amounts to an involvement in 'invisible teaching'. For, whoever makes use of these study materials would virtually derive the benefit of learning under their collective care without each being seen by the other.

The more a learner would seriously pursue these study materials, the easier it will be for him or her to reach out to larger horizons of a subject. Care has also been taken to make the language lucid and presentation attractive so that they may be rated as quality self-learning materials. If anything remains still obscure or difficult to follow, arrangements are there to come to terms with them through the counselling sessions regularly available at the network of study centres set up by the University.

Needless to add, a great deal of these efforts is still experimental—in fact, pioneering in certain areas. Naturally, there is every possibility of some lapse or deficiency here and there. However, these do admit of rectification and further improvement in due course. On the whole, therefore, these study materials are expected to evoke wider appreciation the more they receive serious attention of all concerned.

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Notification

Netaji Subhas Open University

PGGR – 04
Qunatitative Techniques

Group B

Unit 1 □ Point Pattern Analysis

Structure

1.1 Introduction

The flowchart of geographical understanding is : *Geographical Events about human habitat, economy and society → Spatial Pattern → Identification of Order in Observed Pattern → Determination of its Characteristics → Identification of the Order-forming Process → Multivariate Analysis → Scientific Geographical Explanation.* With roots in the 1950s, Quantitative Revolution (QR-I) actually took place the 1960s. The four main factors that promoted and maintained the development of a new approach in geography were – the availability of geographical data, the pace of change in the geographical phenomena, the technological changes in the handling of information and a pervasive belief in the usefulness of science. More emphasis was then given on the problem of why-man-lives-as-he-does and less emphasis on how he lives. This involves changes in methods by incorporating ideas from other disciplines. Geographers began talking of – spatial analysis, inferential techniques, concepts, laws, models, theories, behaviour, perception, prediction, ecosystem, linkages, matrices, equations, formulae and paradigms. Scientific explanation is given in-terms-of abstract mathematical and statistical parameters and therefore Quantitative Geographers viewed the human landscape in terms of set patterns, ordered processes and strict regularities.

Spatial differentiation is an important theme of geographical research. It concerns the study of differences between areas in terms of the numerous geographical phenomena (e.g., characteristics of slope, altitude, relief, soil, drainage, climate, vegetation, mineral, irrigation, agriculture/cropping, farming, industry, settlement and regional development and so on). In each case the ultimate aim is to find the amount of difference (i.e., how large is the difference) and explain it (i.e., how significant it is). Comparative statistics can be a great help in this regard : it provides a descriptive measure of the differences between sets of data and when the data relate to sample measurements, it also enable inferences to be made about differences between the populations from which the samples have been taken.

Requirements :

1. Database of Districtwise Population of West Bengal (1991)
2. Database of Districtwise Population of West Bengal (2001)
3. A Map of West Bengal with Districts
4. Ruler, Set Squares, Calculator, Transparent Graph (mm), Pen, Pencil, Eraser etc.

Procedures :

1. Draw a horizontal line touching the southern tip of the map, i.e., the x – axis
2. Draw a vertical line touching the western tip of the map, i.e., the y – axis
3. The intersection of the two produces the origin of the rectangular co-ordinate system
4. Graduate the lines in centimeter divisions
5. Locate, by eye estimation the centroid of the districts (i.e., the areal mean center of the districts)
6. Overlay a transparent graph paper on the map such that the rectangular reference system coincides with those on it
7. Derive by manipulation the rectangular co-ordinates, i.e., the x – and y – values (i.e., x_i, y_i) of the centroid of each district and record these neatly in a worksheet
8. Compute the products of (x_i) and (P_i) and (y_i) and (P_i) and then the co-ordinates of the mean centers of population separately for 1991 and 2001 as:

$$\bar{x}_p = [\Sigma(x_i.P_i)\ ]/\Sigma P_i \text{ and}$$

$$\bar{y}_p = [\Sigma(y_i.\ P_i)\ ]/\Sigma P_i$$

9. Locate the mean centres ($\bar{x}_p$, $\bar{y}_p$) on map by manipulation and label these appropriately
10. Measure using protractor and ruler the direction and magnitude of the shift of the mean centres during the 10 years

Note : Magnitude and direction of the locational shift of the mean centres can also be manipulated mathematically as :

$$\text{Magnitude (d)} = \sqrt{\{(\bar{x}_1 - \bar{x}_2)^2 + (\bar{y}_1 - \bar{y}_2)^2\}} \text{ and}$$

$$\text{Direction } (\theta) = \tan^{-1}\{(\bar{y}_1 - \bar{y}_2)/(\bar{x}_1 - \bar{x}_2)\}$$

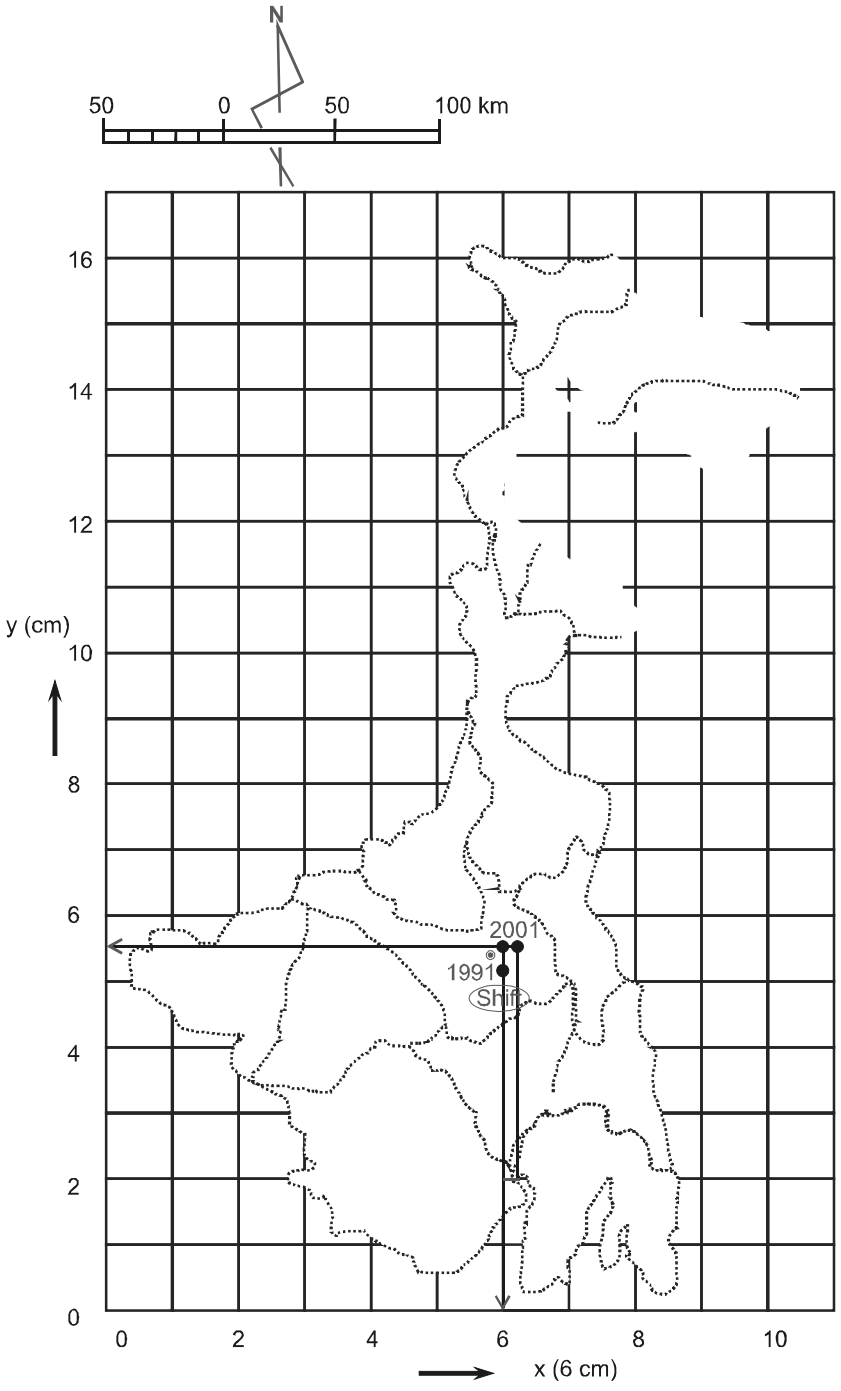
11. Locations of the mean centers along with its shift are then interpreted with geographical perspective

Table – 1 : WORKSHEET FOR THE MEAN CENTRES OF POPULATION

District	Co-ordinates (cm)		Population		Products				Computations for Co-ordinates of Mean Centers
	x	y	2001 : (P_{01})	1991 : (P_{91})	$x.P_{01}$	$y.P_{01}$	$x.P_{91}$	$y.P_{91}$	
Purulia	1.6	5.0	2535233	2224577	4056372.8	12676165.0	3559323.2	11122885.0	
Bankura	3.5	4.5	3191822	2805065	11171377.0	14363199.0	9817727.5	12622792.5	
Midnapore	4.2	2.3	9638473	8331912	40481586.6	22168487.9	34994030.4	19163397.6	
Birbhum	4.8	6.7	3012546	2555664	14460220.8	20184058.2	12267187.2	17122948.8	
Burdwan	5.2	5.2	6919698	6050605	35982429.6	35982429.6	31463146.0	31463146.0	
Nadia	7.0	5.5	4603756	3852097	32226292.0	25320658.0	26964679.0	21186533.5	
U. Dinajpur	5.6	12.5	2441824	1926729	13674214.4	30522800.0	10789682.4	24084112.5	1991
Malda	6.0	10.0	3290160	2637032	19740960.0	32901600.0	15822192.0	26370320.0	$\bar{x} = (?(x.P_{91}) / ?P_{91})$ = 5.97 cm
Hooghly	5.8	3.8	5040047	4355230	29232272.6	19152178.6	25260334.0	16549874.0	
Howrah	5.8	2.8	4274010	3729644	24789258.0	11967228.0	21631935.2	10443003.2	$\bar{y} = (?(y.P_{91}) / ?P_{91})$ = 5.54 cm
Murshidabad	6.3	7.0	5863717	4740149	36941417.1	41046019.0	29862938.7	33181043.0	
Darjeeling	6.5	15.3	1605900	1299919	10438350.0	24570270.0	8449473.5	19888760.7	
Kolkata	6.7	3.0	4580544	4399819	30689644.8	13741632.0	29478787.3	13199457.0	2001
D. Dinajpur	7.0	10.8	1502647	1200924	10518529.0	16228587.6	8406468.0	12969979.2	
24 Parganas (S)	7.0	2.0	6909015	5715030	48363105.0	13818030.0	40005210.0	11430060.0	$\bar{x} = (?(x.P_{01}) / ?P_{01})$ = 5.99 cm
24 Parganas (N)	7.5	3.6	8930295	7281881	66977212.5	32149062.0	54614107.5	26214771.6	
Jalpaiguri	8.4	14.5	3403204	2800543	28586913.6	49346458.0	23524561.2	40607873.5	$\bar{y} = (?(y.P_{01}) / ?P_{01})$ = 5.60 cm
Coochbehar	9.0	13.5	2478280	2171145	22304520.0	33456780.0	19540305.0	29310457.5	
Sum Total =			80221171	68077965	480634675.8	449595642.9	406452088.1	376931415.6	

MEAN CENTRE OF POPULATION

WEST BENGAL, 2001



F - 3

1.3 Nearest Neighbour Analysis of Settlement Pattern and its change over time

A geographical pattern is determined by the relative distances of spacings of a group of objects in relation to one another. Clark and Evans (1914) devised the Nearest Neighbour Analysis (NNA) based on the assumption that in a random pattern the first nearest neighbour distances are normally distributed. NNA concerns the measurement of actual straight-line distance irrespective of this distance with one that might be expected if the points were distributed at random in the same area.

The NN index is given by :

$$R_n = (\bar{r}_o/\bar{r}_e)$$

where,

$\bar{r}_o$ = observed mean nearest neighbour distance and $\bar{r}_e$ = expected mean nearest neighbour distance

The observed mean nearest neighbour distance, $\bar{r}_o = (\Sigma r_i)/n$

The expected mean nearest neighbour distance, $\bar{r}_e = (1/2).(\sqrt{(A/n)}$

where,

n = no. of settlements,

r_i = distance from i^{th} settlement to its nearest neighbour and

A = area

R_n provides and index of the departure from randomness. It is less, equal to or greater than one, depending upon whether the pattern tends to be aggregated, random, uniform & dispersed respectively.

Compute the Nearest Neighbour Index of Settlement Pattern and interpret.

Requirements :

1. A map showing spatial pattern of settlements
2. Ruler, Diagonal Scale, Divider, Protractor, Calculator, Pen, Pencil, Eraser etc.

Procedures :

1. Draw points at the centre of each settlement
2. Note the area of the map under consideration
3. Also note the total number of settlements
4. From each settlement measure the distance of its nearest neighbouring settlement

5. From the set of nearest neighbour distances, compute the mean observed nearest neighbour distance
6. Compute the mean expected nearest neighbour distance
7. Finally compute the nearest neighbour index and interpret the nature of spatial distribution of settlements

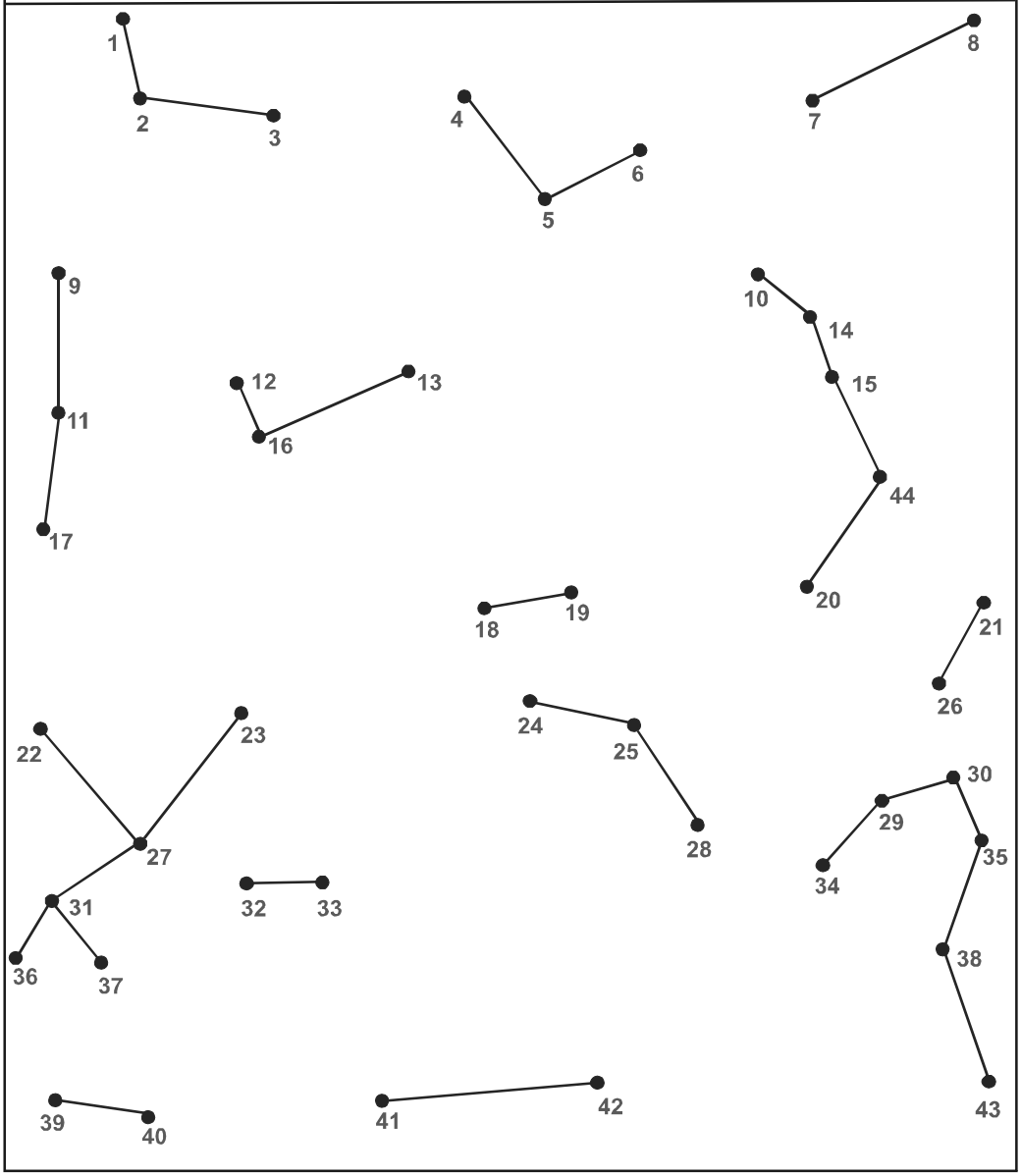
Table – 2 : WORKSHEET FOR NEAREST NEIGHBOUR ANALYSIS

Settlement with Nearest Neighbour	Nearest Neighbour Distance (cm)	Settlement with Nearest Neighbour	Nearest Neighbour Distance (cm)	Computation
1 – 2	1.25	23 - 27	2.60	?NND = 73.5 cm Mean NND = $\bar{r}_o$ = (?NND / 44) = 1.67 cm = 0.835 Km Density of Settlement: P = (N / A) = (44/72.285) / sq.km. = 0.6087 / sq.km. Mean Expected: NND = $\bar{r}_e$ = 1 / (2* vP) = 1 / (2* v0.608070) = 0.641 Km $R_n = (\bar{r}_o / \bar{r}_e)$ = (0.835 / 0.641) = 1.30 Therefore, the settlements are more random than dispersed.
2 – 1	1.25	24 - 25	1.60	
3 – 2	2.10	25 - 24	1.60	
4 – 5	2.00	26 - 21	1.40	
5 – 6	1.70	27 - 31	1.70	
6 – 5	1.70	28 - 25	1.80	
7 – 8	2.70	29 - 30	1.20	
8 – 7	2.70	30 - 35	1.00	
9 – 11	2.20	31 - 36	1.20	
10 - 14	1.00	32 - 33	1.10	
11 - 17	1.70	33 - 32	1.10	
12 - 16	0.90	34 - 29	1.30	
13 - 16	2.50	35 - 30	1.00	
14 - 15	1.00	36 - 31	1.20	
15 - 14	1.00	37 - 31	1.20	
16 - 12	0.90	38 - 35	1.70	
17 - 11	1.70	39 - 40	1.60	
18 - 19	1.40	40 - 39	1.60	
19 - 18	1.40	41 - 42	3.30	
20 - 44	2.10	42 - 41	3.30	
21 - 26	1.40	43 - 38	2.20	
22 - 27	2.50	44 - 15	1.70	

SETTLEMENT PATTERN ANALYSIS
BY
NEAREST NEIGHBOUR INDEX

TOPOGRAPHICAL MAP NO. - 73E / 2

GRID - B 3
SCALE = 1 : 50,000



Unit 2 ❑ Line Pattern Analysis

Structure

2.1 Measures of Connectivity (alpha, beta and gamma index)

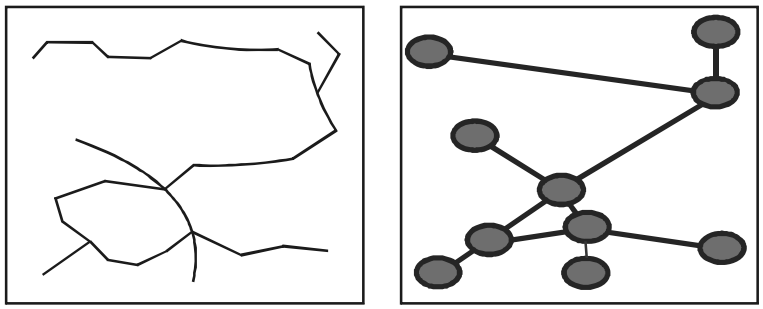
2.2 **Measures of accessibility from a point (de tour index)**

2.1 Measures of Connectivity (alpha, beta and gamma index)

Several measure and indices can be used to analyze the network efficiency. Many of them were initially developed by Kansky, 1963 and can be used for

(a)expressing the relationship between values and the network structures they represent, (b) comparing different transportation networks at a specific point in time", and (c) comparing the evolution of a transport network at different points in time.

A graph is a symbolic representation of a network and of its connectivity. It implies an abstraction of the reality so it can be simplified as a set of linked nodes. In transport geography networks are analyzed for connectivity as all transport networks can be represented by graph theory in one way or the other. The following elements are fundamental at understanding graph theory :

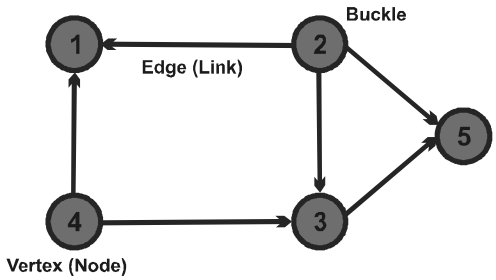


Real Network Graph Representation

Graph : A graph *G* is a set of vertex (nodes) v connected by edges (links) *e*. Thus *G=(v, e)*.

Vertex (Node). A node v is a terminal point or an intersection point of a graph. It is the abstraction of a location such as a city, an administrative division, a road intersection or a transport terminal (stations, terminuses, harbors and airports).

Edge (Link). An edge *e is a* link between two nodes. The link *(i, j)* is of initial extremity *i* and of terminal extremity *j. A* link is the abstraction of a transport infrastructure supporting movements between nodes. It has a direction that is commonly represented as an arrow. When an arrow is not used, it is assumed the link is bidirectional.

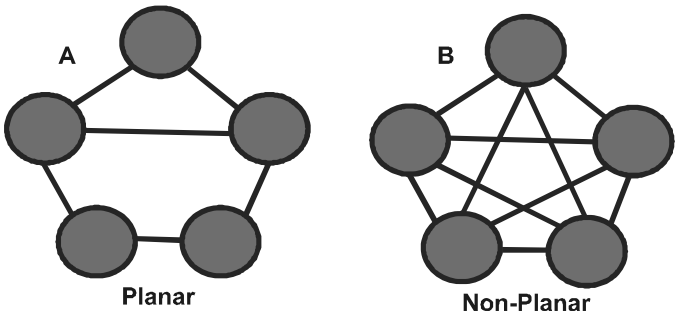


Sub-Graph. A sub-graph is a subset of a graph G where p is the number of subgraphs. For instance $G' = (v,e')$ can be a distinct sub-graph of G. Unless the global transport system is considered in its whole, every transport network is in theory a sub-graph of another. For instance, the road transportation network of a city is a subgraph of a regional transportation network, which is itself a sub-graph of a national transportation network.

Buckle. A link that makes a node correspond to itself is a buckle.

Planar Graph. A graph where all the intersections of two edges are a vertex. Since this graph is located within a plane, its topology is two-dimensional.

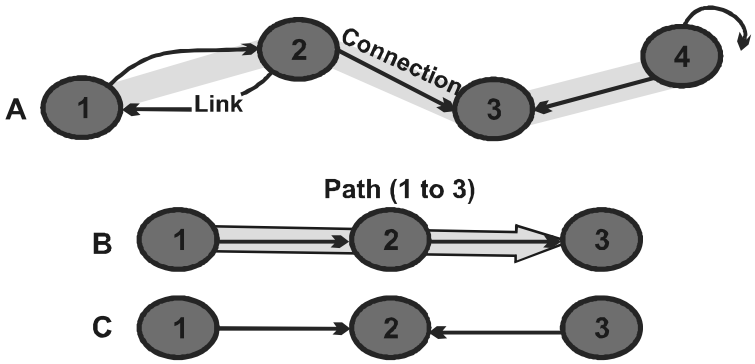
Non-planar Graph. A graph where there are no vertex at the intersection of at least two edges. This implies a third dimension in the topology of the graph since there is the possibility of having a movement "passing over" another movement such as for air transport. A non-planar graph has potentially much more links than a planar graph.



Graph A is planar since no linkage is overlapping with another. Graph B is non-planar since many links are overlapping and cannot be reconfigured in a manner that would make it planar. The goal of a graph is representing the structure, not the appearance of a network. The conversion of a real network into a planar graph is a straightforward process which follows some basic rules : (a) every terminal and intersection point becomes a node, (b) each connected nodes is then linked by a straight segment. The real network, depending on its complexity, may be confusing

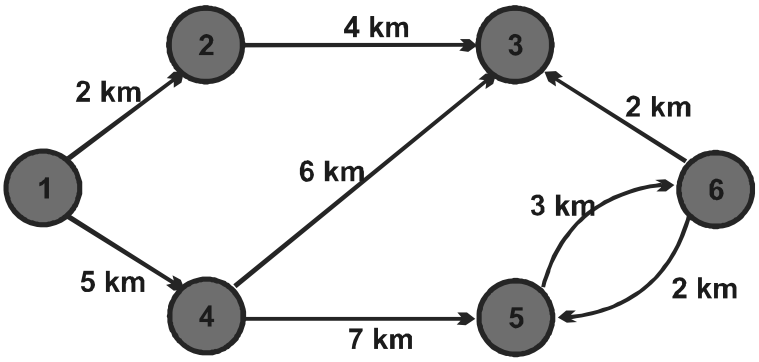
in terms of revealing its connectivity (what is linked with what). A graph representation reveals the connectivity of a network in the best possible way. Other rules can also be applied, depending on the circumstances :

A node that is not a terminal or an intersection point can be added to the graph if along that segment an ***attribute is changing.*** *For instance, it would be recommended to represent as a node the shift from 2 lanes to 4 lanes along a continuous road segment, even if that shift does not occur at an intersection or terminal point.*



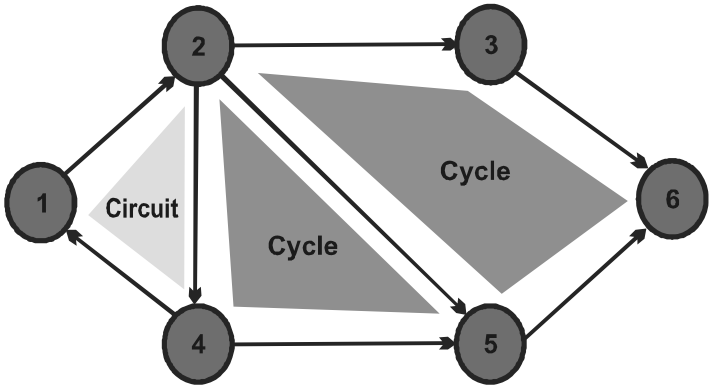
Connections and Paths

On graph A, there are 5 links [(1,2), (2,1), (2,3), (4,3), (4,4)] and 3 connections [(1-2), (2-3), (3-4)]. On graph C, there is a path between 1 and 3, but on graph C there is no path between 1 and 3.



Length of a Link, Connection or, Path

On this graph, the length of link (2,3) is 4 km awl the length of the path between 1 and 6 (1-4-5-6; 3 segments) is 15 km.

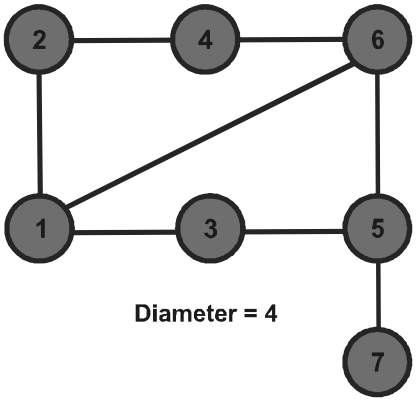


Cycles and Circuits

On this graph, 2-3-6-5-2 is a cycle but not a circuit. 1-2-4-1 is a cycle and a circuit.

The three basic measures of the structural attributes of a graph are the diameter, the number of cycles and the order of a node.

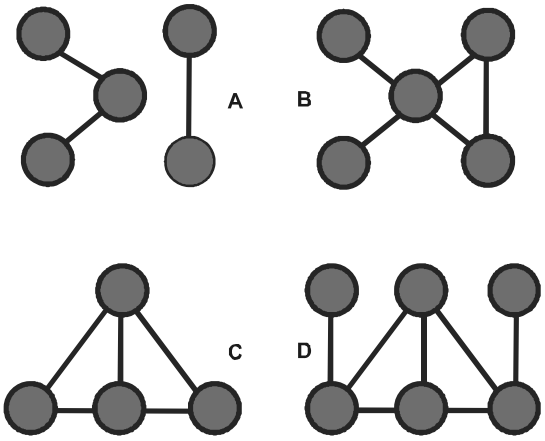
Diameter *(d)* : It is defined as the length of the shortest path between the most distanced nodes of a graph. Thus, it measures the extent of a graph and the topological length between two nodes. It also enables to measure the development of a network in time. The larger the diameter, the less linked a network tends to be.



Shibel Distance							
v	1	2	3	4	5	6	7
1	0	1	1	2	2	1	3
2	1	0	2	1	3	2	4
3	1	2	0	3	1	2	2
4	2	1	3	0	2	1	3
5	2	3	1	2	0	1	1
6	1	2	2	1	1	0	2
7	3	4	2	3	1	2	0

Number of Cycles ***(u)*** : It is defined as the maximum number of independent cycles in a graph and is estimated through the number of nodes (v), links *(e)* and of sub-graphs (p). The formula is, $u = e\text{-}v+p$.

Thus, in simple networks, $u = 0$ since they have no cycles. The more complex a network is, the higher the value of u, so it can be used as an indicator of the level of development and complexity of a transport system.



$u = e\text{-}v\text{+}p$

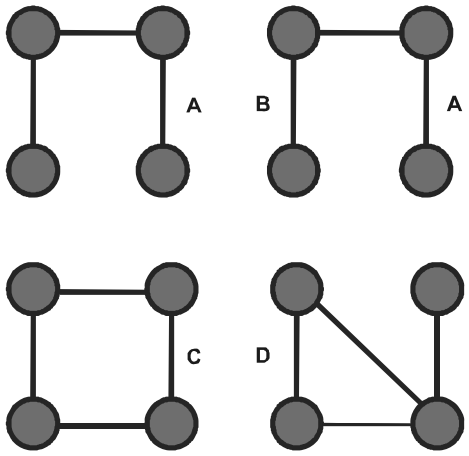
	e	v	p	u
A	3	5	2	0
B	5	5	1	1
C	5	4	1	2
D	6	7	1	2

Order (degree) of a Node (o) : It is defined as the number of its attached links and is a simple, but effective measure of nodal importance. The higher its value, the more a node is important in a graph as many links converge to it. Hub nodes have a high order, while terminal points have an order that can be as low as 1. A perfect hub would have its order equal to the summation of all the orders of the other nodes in the graph and a perfect spoke would have an order of 1.

Connectivity Indexes : Indexes are more complex methods to represent the structural properties of a graph since they involve the comparison of a measure over another :

Beta Index (β) : It measure the level of connectivity in a graph and is expressed *by* the relationship between the number of links (e) over the number of nodes (v). For trees and simple networks, $\beta < 1$ and for a connected network with me cycle, $\beta = 1$. More complex networks have a value greater than 1. In a network with a fixed number of nodes, the higher the number of links, the higher the number of paths possible in the network. Therefore, complex networks have a high value of Beta.

$$\beta = \frac{e}{v}$$

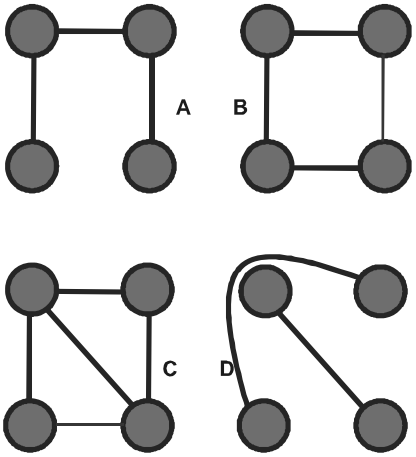


$$\beta = \frac{e}{v}$$

	e	v	Beta
A	2	4	0.5
B	3	4	0.75
C	4	4	1.0
D	5	4	1.25

Alpha Index (a) : It is a measure of connectivity which evaluates the number of cycles in a graph in comparison with the maximum number of cycles. The higher the alpha index, the more a network is connected. For trees and simple networks, $a = 0$ and for a completely connected network, a = 1. Thus, it measures the level of connectivity independently of the number of nodes. It is very rare that a network will have an alpha value of 1, because this would imply very serious redundancies.

$$a = \frac{u}{2v - 5}$$

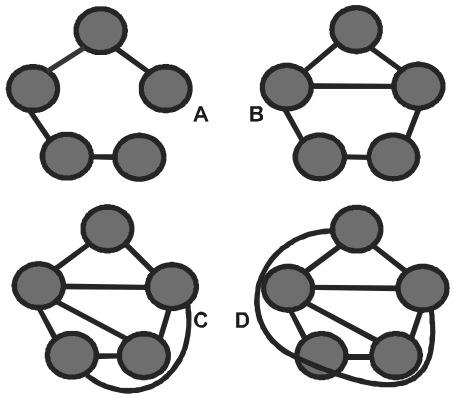


$$a = \frac{u}{2v - 5}$$

	u(e-v+p)	2v-5	Alpha
A	0	3	0.0
B	1	3	0.33
C	2	3	0.66
D	3	3	1.0

Gamma Index (y): It is a measure of connectivity that considers the relationship between the number of observed links and the number of possible links. The value of gamma lies between 0 and 1. $\gamma = 1$ indicates a completely connected network, although it is extremely unlikely in reality. Gamma is an efficient value to measure the progression of a network in time.

$$\gamma = \frac{\mathbf{e}}{\mathbf{3(v - 2)}}$$



$$\gamma = \frac{3}{3(v - 2)}$$

	e	3(v-2)	Gamma
A	4	9	0.44
B	6	9	0.66
C	8	9	0.88
D	9	9	1.0

Example : Compute the attributes of the structure of the given transport network and interpret.

Requirements :

1. A Transport Network Map
2. Calculator, Marker, Pen, Pencil, Eraser etc.

Procedures :

1. Identify and count the numbers of vertex, edge, subgraphs, planar and non-planar graphs
2. Compute the diameter, number of cycles and order of nodes
3. Compute the alpha, beta and gamma index and interpret the values

Table – 3 : WORKSHEET FOR CONNECTIVITY INDICES

Transport Network of Roadways of South Bengal

Total No. of 'arc' = 95

Total No. of 'node' = 71

alpha index = (arc – node – 1) / (2 . node – 5)
= (95 – 71 – 1) / (2 x 71 – 5)
= 23 / 137
= 0.17

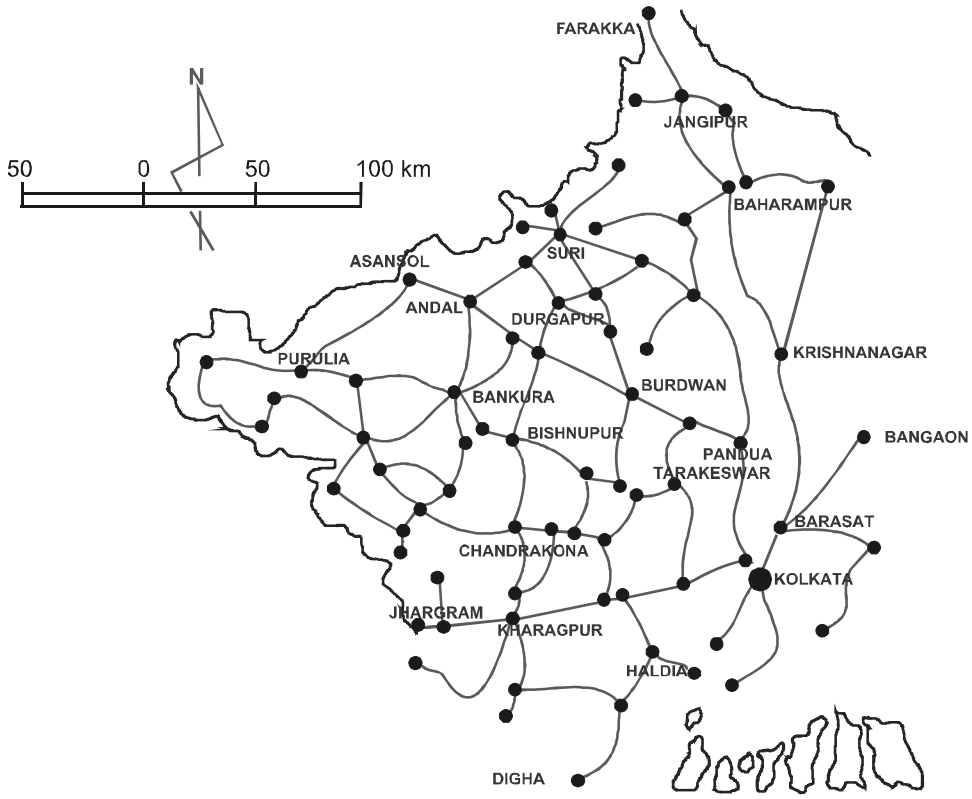
beta index = arc / node
= 95 / 71
= 1.34

gamma index = arc / 3. (node – 2)
= 95 / 3 x (71 – 2)
= 95 / 207
= 0.46

TRANSPORT NETWORK ANALYSIS

OF

THE ROADWAY NETWORK OF SOUTH BENGAL



DEGREE OF CONNECTIVITY

arc=95, node=71

μ = arc- (node-1)
= 95 - (71-1)
= **25**

α = (arc-node-1)/(2. node-5)
= 95-71-1)/[(2).(71)-5]
= **0.17**

β = arc/node
= 95/71
=**1.34**

γ = arc/3 (node-2)
= 95/3 (71-2)
= **0.46**

2.2 Measures of accessibility from a point (de Tour index)

Detour Index : It is a measure of the efficiency of a transport network in terms of how well it overcomes distance or the friction of distance. The closer the detour index gets to 1, the more the network is spatially efficient. Networks having a detour index of 1 are rarely, if ever, seen and most networks would fit on an asymptotic curve getting close to 1, but never reaching it.

$$DI = \frac{DD}{TD}$$

For instance, the straight distance (*DD*) between two nodes may be 40 km but the transport distance (*TD*; real distance) is 50 km. The detour index is thus 0.8 (40/ 50). The complexity of the topography is often a good indicator of the level of detour.

Example : Draw a 'de tour map' for the given Road Transport Network and interpret.

Requirements :

1. A Map showing Network of Road Transport
2. Calculator, Marker, Pen, Pencil, Eraser etc.

Procedures :

1. From the central point find the straight distance (DD)
2. From the central point find also the real transport distance (TD)
3. Compute the de Tour index for all the given nodes, except the central node and jot down the values for respective locations
4. Draw isopleths of de Tour index with a suitable interval and interpret.

Table – 4 : WORKSHEET FOR DE TOUR INDEX

Base Point : Kolkata

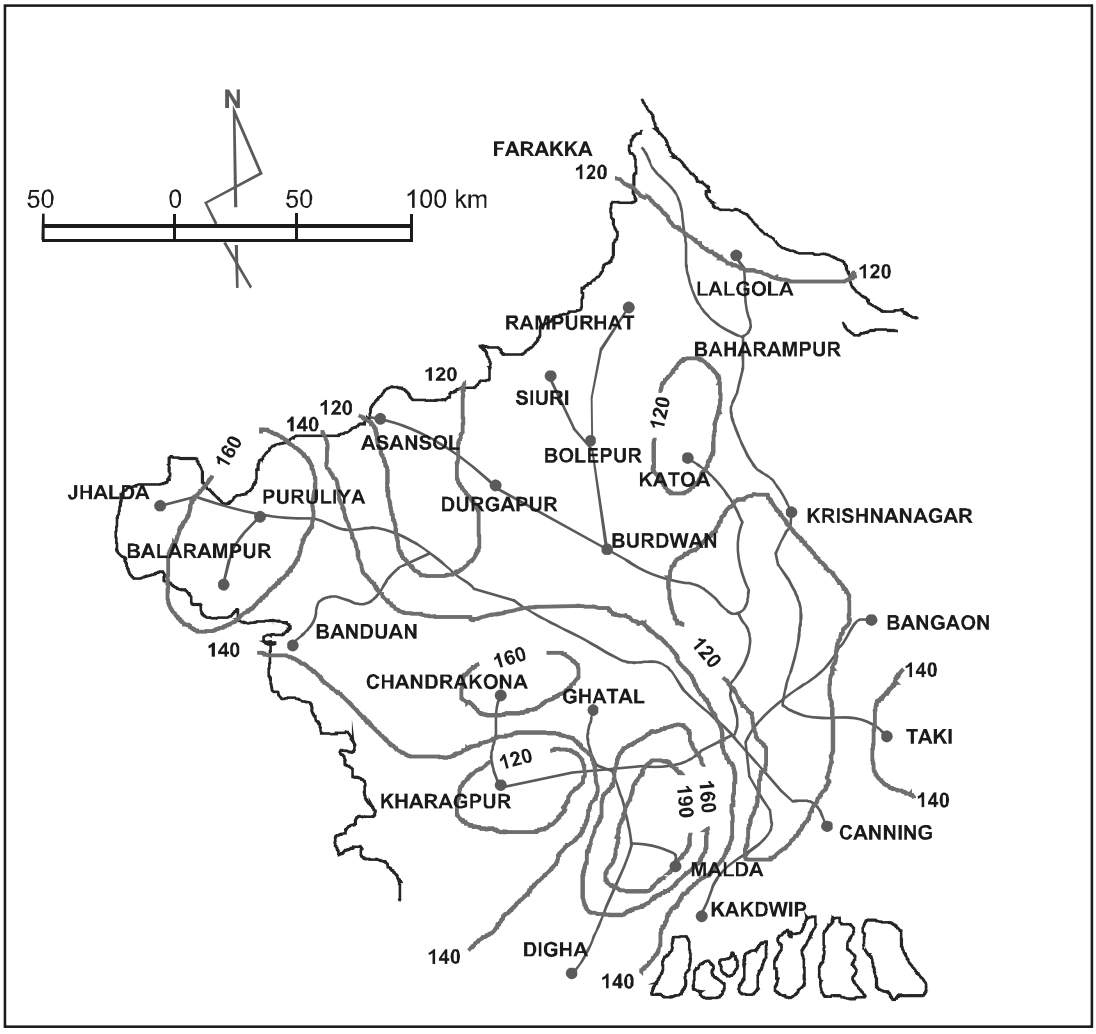
Place	Actual Distance (km) : TD	Direct Distance (km) : DD	De Tour Index = (TD / DD) x 100 %
Canning	047.2	038.9	121.3
Taki	069.4	047.2	147.0
Bongaon	088.8	072.2	123.0
Krishnanagar	113.0	091.7	123.2
Baharampur	202.0	163.9	123.2
Lalgola	228.0	197.2	115.6
Farakka	288.8	241.7	119.5
Rampurhat	227.8	180.6	126.1
Suri	205.0	163.9	125.0
Bolpur	163.0	133.3	122.2
Burdwan	119.0	091.7	129.7
Durgapur	182.0	144.4	126.0
Asansol	222.0	191.7	115.8
Bankura	175.0	147.2	118.9
Purulia	328.0	197.2	166.3
Jhalda	372.0	247.2	150.5
Balarampur	358.0	213.9	167.3
Banduan	258.3	183.3	140.9
Chandrakona	166.6	100.0	166.6
Kharagpur	118.0	102.8	114.7
Digha	170.0	113.9	149.2
Haldia	113.8	052.8	215.5
Ghatal	100.0	063.9	156.4
Katwa	138.8	116.6	119.0
Kakdwip	077.8	063.8	121.9

TRANSPORT NETWORK ANALYSIS

ACCESSIBILITY MAP BASED ON DE TOUR INDEX

(BASE POINT = KOLKATA)

(ROADWAY NETWORK OF SOUTH BENGAL)



Unit 3 □ Areal Pattern Analysis

3.1 Measures of specialisation

3.1.1 Dominant and Distinctive Analysis

This is an important technique used in geographical studies to identify within a group of attributes the dominant one as well as the distinctive one. The dominant one of a geographical object or entity can be easily identified from the highest percentage share of an attribute. The distinctive one is judged based on a set of attribute values for the whole region. For this, 'mean' and 'standard deviation' are used to determine the 'degree of distinctiveness' of any particular attribute. For this, a worksheet to be prepared with geographical entities (i.e., blocks, districts. States, etc) in the 1st column and the values of the attributes in the successive columns. The values may be absolute numbers as well as relative proportions (%).

The following table shows a distribution of proportion of three (3) variables in the six (6) districts of a state. Figures corresponding to rows concern a particular district and are used to identify the dominant attribute of a district. Thus attribute – 1 is dominant in AA, BB, and DD districts, attribute – 2 is dominant in CC and FF districts and attribute – 3 is dominant only in EE district. Thus dominant one is identified by inspecting the rowwise values of a geographical entity.

District	Values on Attributes (%)		
	Variable – 1	Variable – 2	Variable – 3
AA	56	30	14
BB	68	20	12
CC	32	42	26
DD	40	30	30
EE	10	20	70
FF	30	60	10
Mean	39.3	33.7	27.0
Standard Deviation	20.5	15.3	22.5

Attribute	Criteria	Range	Degree of Distinctiveness	District
1	(Mean + 1SD) to (Mean + 2SD)	59.8 – 80.3	1	BB
2	(Mean + 1SD) to (Mean + 2SD)	49.0 – 64.3	1	FF
3	(Mean + 1SD) to (Mean + 2SD)	49.5 – 72.0	1	EE
Thus, attribute – 1 is distinctive only in BB district, attribute – 2 in FF district and attribute – 3 in EE district.				

The distinctiveness of an attribute is identified by analysing the values entered in a particular column. This means distinctiveness concerns a single attribute as distributed within the six districts of a state. For this 'mean' and 'standard deviation' of the attributes are computed first and then compared within the districts. Degree of distinctiveness is 1, if the attribute value lies between (Mean + 1SD) to (Mean + 2SD), 2 when the value lies between (Mean + 2SD) to (Mean + 3SD), 3 when (Mean + 3SD) to (Mean + 4SD), and so on. Thus dominant is **'local'** but distinctiveness is **'regional'** in character and context. **All distinctive attributes may be dominant but all dominants are never distinctive.**

Example : Make a 'Dominant and Distinctive Analysis' of Crop Production of West Bengal, 2001 - 2002.

Requirements :

1. A database with districtwise data of crop production.
2. Calculator, Marker, Pen, Pencil, Eraser etc.

Procedures :

1. Find the highest value in each row, mark them as the 'dominant' one
2. For each column, compute the 'mean' and 'standard deviation'
3. Prepare a 'distinctiveness table' and for each landuse category identify the 'distinctive' ones with 'degree'
4. Draw 'diagrammatic map' to show the proportional distribution of crop production and mark the 'degree of distinctiveness' with appropriate symbols (Category = letter symbols; Degree = numerals)

Table – 5 : WORKSHEET FOR DOMINANT AND DISTINCTIVE ANALYSIS

Districts	Production of Crops ('000 tonnes)					Proportion of Production of Crops (% of Total)				
	Rice	Pulses	Oilseeds	Jute	Potato	Rice	Pulses	Oilseeds	Jute	Potato
24 Parganas (N) : J	856.4	4.8	37.7	886.6	138.1	**44.5**	0.2	2.0	**46.1**	7.2
24 Parganas (S): R	1003.7	6.6	4.6	16.6	83.5	**90.0**	0.6	0.4	1.5	7.5
Bankura	1222.4	0.4	18	2.4	522.9	**69.2**	0.0	1.0	0.1	29.6
Birbhum : R, P	1157.4	17.9	38.8	7.7	273.2	**77.4**	**1.2**	2.6	0.5	18.3
Burdwan	1930.6	3.5	44.5	400.9	1217.3	**53.7**	0.1	1.2	11.1	33.8
Coochbehar : J	466.7	5.7	7.2	904.3	275.1	28.1	0.3	0.4	**54.5**	16.6
D. Dinajpur	425.3	2.2	17.1	182.5	66.5	**61.3**	0.3	2.5	26.3	9.6
Darjeeling : Po	59.2	1.3	0.3	30.9	98.6	31.1	0.7	0.2	16.2	**51.8**
Hooghly : Po_3	847.7	0.3	27.6	623.5	2356.4	22.0	0.0	0.7	16.2	**61.1**
Howrah	287.6	0.2	3.7	80.9	198.4	**50.4**	0.0	0.6	14.2	34.8
Jalpaiguri	410.1	1.9	6.3	510.3	314.9	33.0	0.2	0.5	**41.0**	25.3
Malda : P_3	536.2	25.6	37	370.8	44.5	**52.9**	**2.5**	3.6	36.6	4.4
Midnapore	2710.8	14.4	79.5	167.1	1823.4	**56.5**	0.3	1.7	3.5	38.0
Murshidabad : J	1085.4	34.7	58.6	2010	174.4	32.3	1.0	1.7	**59.8**	5.2
Nadia : J, O_2	958.7	38.4	1116.4	2330.6	106.2	21.1	0.8	**24.5**	**51.2**	2.3
Purulia : R_2	745.1	6.5	2.3	0	12.7	**97.2**	0.8	0.3	0.0	1.7
U. Dinajpur : Po	554.4	10.7	29.7	611.1	1161.3	23.4	0.5	1.3	25.8	**49.1**
Note : Dominant Crops = underlined Bold Distinctive Crops = in colour (Red = 1st order, Blue = 2nd order, Pink = 3rd order)					Mean	49.7	0.6	2.7	23.8	23.3
					Stand. Dev	23.6	0.6	5.7	20.8	18.9

Dominant Crops :

(1) Rice – North 24 Parganas, South 24 Parganas, Bankura, Birbhum, Burdwan, D. Dinajpur, Howrah, Malda, Midnapur and Purulia

(2) Jute – Coochbehar, Jalpaiguri, Murshidabad and Nadia

(3) Potato – Darjilling, Hooghly and U. Dinajpur

Distinctive Crops :

(1) Rice - South 24 Parganas and Birbhum (1st order); and Purulia (2nd order)

(2) Pulses – Birbhum (1st order); and Malda (3rd order)

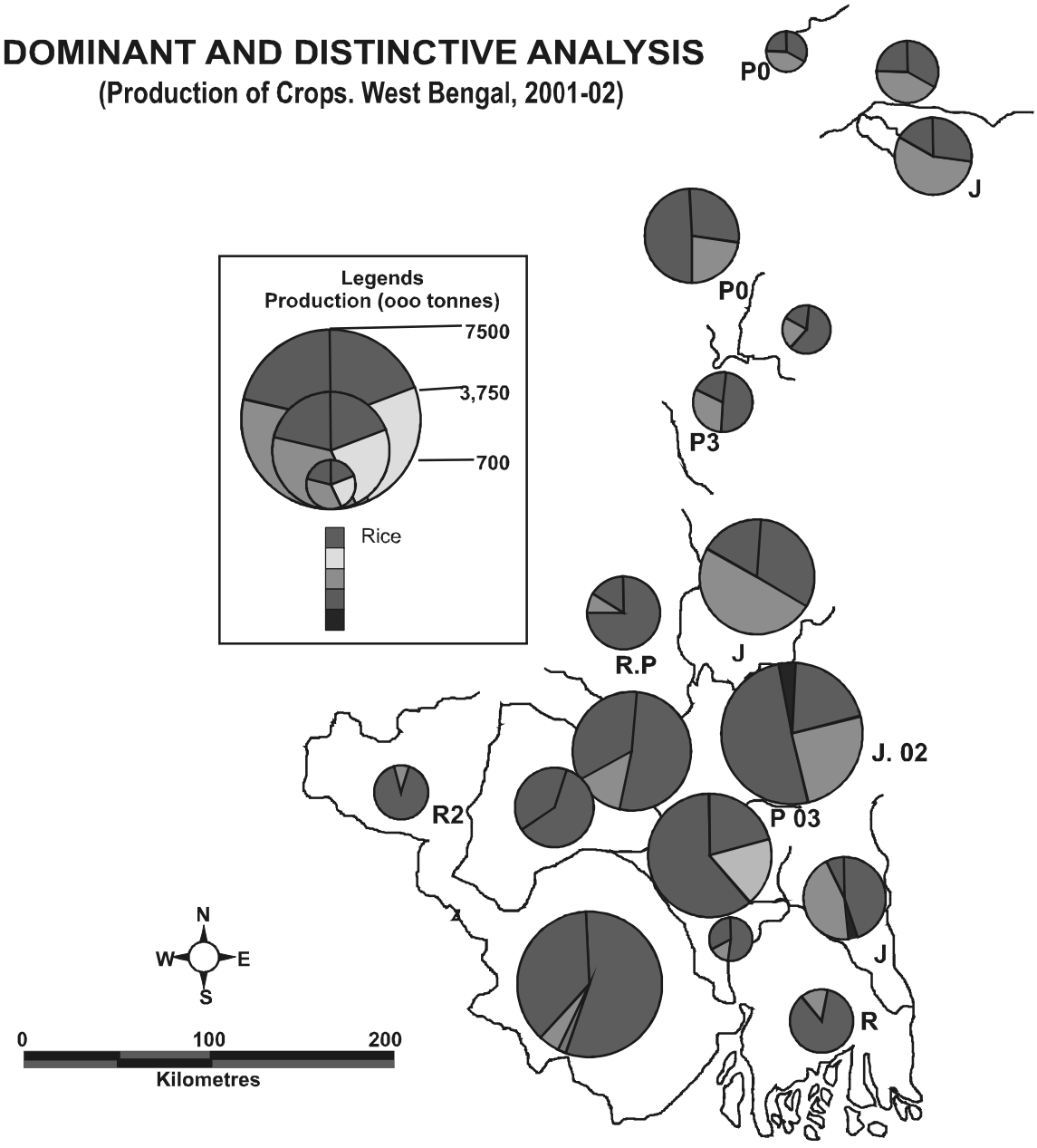
(3) Oilseeds – Nadia (3rd order)

(4) Jute – North 24 Parganas, Coochbehar, Murshidabad and Nadia (1st order)

(5) Potato – Darjilling, U. Dinajpur (1st order); and Hooghly (3rd order)

DOMINANT AND DISTINCTIVE ANALYSIS

(Production of Crops. West Bengal, 2001-02)



3.1.2 : Indices of Specialization Location Quotient

The **location quotient technique** is most commonly utilized economic base analysis method **(Haig, 1928)**. It compares the local economy to a reference economy and in the process attempts to identify specializations in the local economy. Location quotients are calculated for all industries to determine whether or not the local economy has a greater share of each industry than expected when compared to a reference economy. If an industry has a greater share than expected of a given industry, then that "extra" industry employment is assumed to be basic because those jobs are above what a local economy should have to serve local needs. The location quotient is most frequently used in economic geography and locational analysis, but it has much wider applicability. The location quotient (LQ) is an index for comparing an area's share of a particular activity with the area's share of some basic or aggregate phenomenon. The formula for computing location quotients can be written as :

$$LQ = \frac{e_i / e}{E_i / E}$$

where,

e_i = Local employment in industry in year T

e = Total local employment in year T

E_i = National employment in industry in year T

E = Total national employment in year T

In this formula, the 'regional' or 'local' economy (often a county or district or state) to the 'national' economy. Location quotients may also be calculated that compare the county to a state. The LQ provides evidence for the existence of basic employment in a given industry. Interpreting the Location Quotient is very simple. Only three general outcomes are possible when calculating location quotients. These outcomes are as follows :

LQ < 1.0 means all employment is non-basic, i.e., local employment is less than was expected for a given industry. In other words, the area has less of a share of the activity than is more generally, or regionally, found. Therefore, that industry is not even meeting local demand for a given good or service. Therefore all of this employment is considered non-basic by definition.

LQ = 1.0 means all employment is non-basic, i.e., local employment is exactly sufficient to meet the local demand for a given good or service. In other words, the area has a share of the activity in accordance with its share of the base. Therefore, all of this employment is also considered non-basic because none of these goods or services are exported to non-local areas.

LQ > 1.0 means some employment is basic, i.e., local employment is greater than expected and it is therefore assumed that this "extra" employment is basic. In other words, there is a relative concentration of the activity in the area compared to the region as a whole. These extra jobs then must export their goods and services to non-local areas which, by definition, makes them basic sector employment.

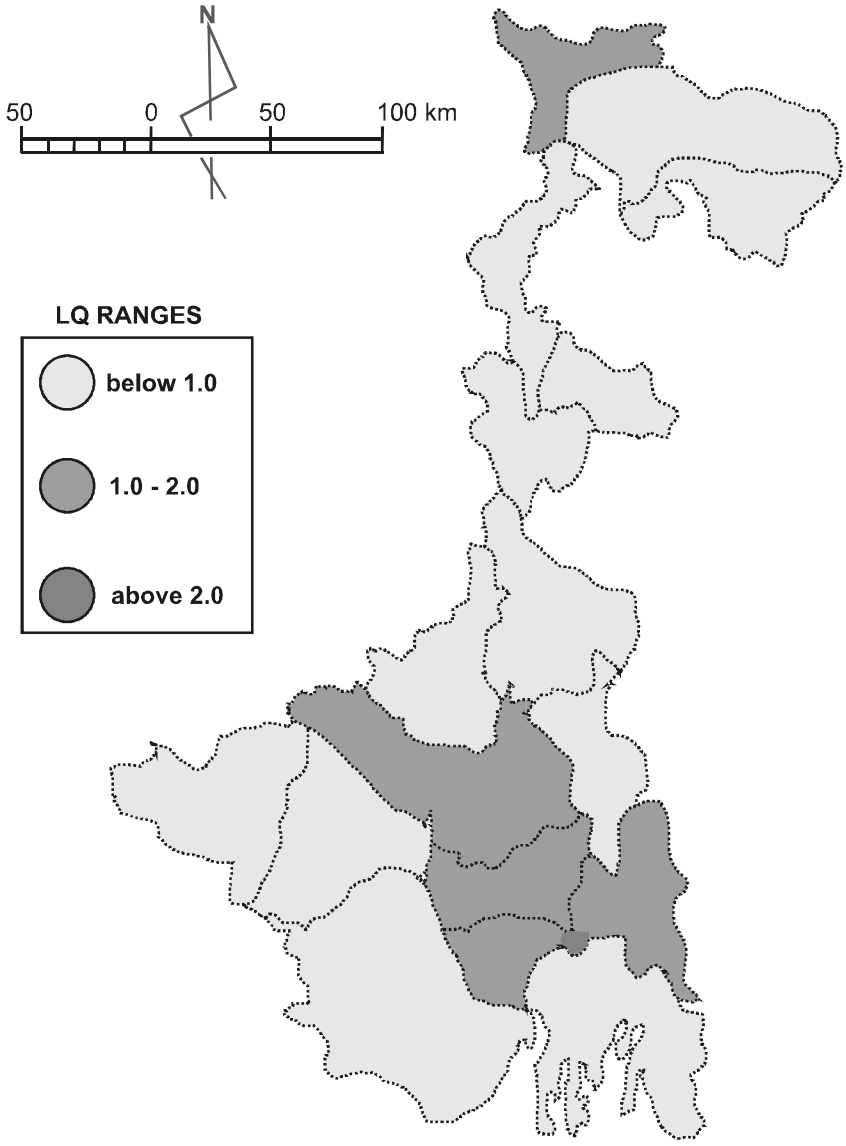
Table – 6 : WORKSHEET FOR LOCATION QUOTIENTS

Districts	Urban Population, 2001 : U	Population 2001 : P	U / TU	P / TP	LQ= (U / TU) / (P / TP)
Purulia	255239	2535233	0.01135	0.03160	0.36
Bankura	235264	3191822	0.01046	0.03978	0.26
Midnapore	1010954	9638473	0.04495	0.12014	0.37
Birbhum	258479	3012546	0.01149	0.03755	0.31
Burdwan	2572423	6919698	0.11439	0.08625	1.33
Nadia	979047	4603756	0.04353	0.05738	0.75
U. Dinajpur	294471	2441824	0.01309	0.03043	0.43
Malda	240915	3290160	0.01071	0.04101	0.26
Hooghly	1687410	5040047	0.07504	0.06282	1.19
Howrah	2153571	4274010	0.09575	0.05327	1.79
Murshidabad	732343	5863717	0.03256	0.07309	0.44
Darjeeling	520877	1605900	0.02316	0.02001	1.16
Kolkata	4580544	4580544	0.20307	0.05709	3.56
D. Dinajpur	196643	1502647	0.00874	0.01873	0.47
24 Parganas (S)	1089730	6909015	0.04846	0.08612	0.56
24 Parganas (N)	4849218	8930295	0.21565	0.11132	1.94
Jalpaiguri	603847	3403204	0.02685	0.04242	0.63
Coochbehar	225506	2478280	0.01002	0.03089	0.32
	TU=22486481	TP=80221171			

Table – 6a : DISTRIBUTION OF LQs

Range of LQs	Districts	Remarks
below 1	Purulia, Bankura, Midnapur, Birbhum, Nadia, Malda, U. Dinajpur, D. Dinajpur, Murshidabad, South 24 Parganas, Jalpaiguri, Cooch Behar	Low
1 to 2	Burdwan, Hooghly, Howrah, Darjilling, North 24 Parganas	Moderate
Above 2	Kolkata	High

CONCENTRATION
OF
URBAN POPULATION OF WEST BENGAL, 2001
BY
LOCATION QUOTIENT ANALYSIS



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Example : Compute the Location Quotients of Urban Population of West Bengal, 2001 and interpret the Location Quotient Map.

Requirements :

1. A database with districtwise Urban and Total Population of West Bengal
2. Calculator, Marker, Pen, Pencil, Eraser etc.

Procedures :

1. Prepare a work sheet with the following columns : Districts, Urban Population of a district (U), Total Population of a district (T), (U/T_U), (P/T_P), and LQ = $(U/T_U)/(P/T_P)$, where Total Urban Population of West Bengal = T_U and Total Population of West Bengal =T_P
2. Compute and enter the figures for 4th, 5th and 6th columns

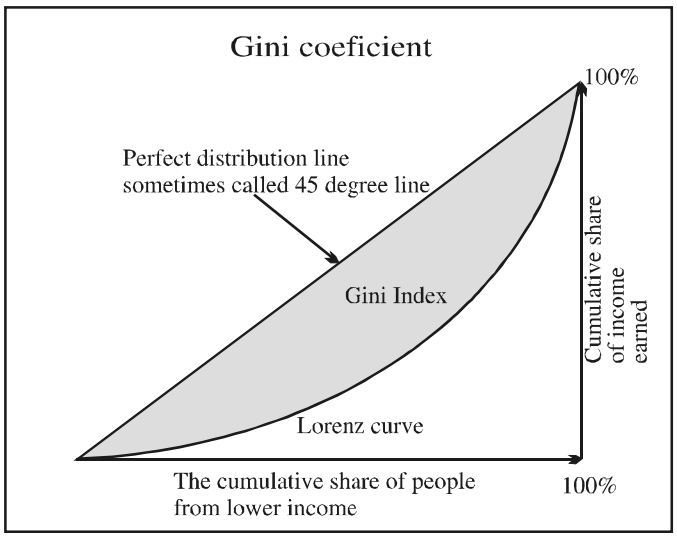
Districts	Urban Population 2001 (U)	Population 2001(P)	(U/T_U)	(P/T_P)	LQ = $(U/T_U)/(P/T_P)$
Purulia	255239	2535233	0.01135	0.03160	0.36
Bankura	235264	3191822	0.01046	0.03978	0.26
Midnapore	1010954	9638473	0.04495	0.12014	0.37
Birbhum	258479	3012546	0.01149	0.03755	0.31
Burdwan	2572423	6919698	0.11439	0.08625	1.33
Nadia	979047	4603756	0.04353	0.05738	0.75
U. Dinajpur	294471	2441824	0.01309	0.03043	0.43
Malda	240915	3290160	0.01071	0.04101	0.26
Hooghly	1687410	5040047	0.07504	0.06282	1.19
Howrah	2153571	4274010	0.09575	0.05327	1.79
Murshidabad	732343	5863717	0.03256	0.07309	0.44
Darjeeling	520877	1605900	0.02316	0.02001	1.16
Kolkata	4580544	4580544	0.20307	0.05709	3.56
D. Dinajpur	196643	1502647	0.00874	0.01873	0.47
24 Parganas (S)	1089730	6909015	0.04846	0.08612	0.56
24 Parganas (N)	4849218	8930295	0.21565	0.11132	1.94
Jalpaiguri	603847	3403204	0.02685	0.04242	0.63
Coochbehar	225506	2478280	0.01002	0.03089	0.32
	Σ = 22486481	Σ = 80221171			

Range of LQ	Districts	Remarks
Below 1	Purulia, Bankura, Midnapore, Birbhum, Nadia, Malda, U. Dinajpur, D. Dinajpur, Murshidabad, 24 Parganas (S), Jalpaiguri, Coochbehar	Low
1 – 2	Burdwan, Hooghly, Howrah, Darjeeling, 24 Parganas (N)	Moderate
Above 2	Kolkata	High

3.2 : Pattern of regional inequality

3.2.1 Lorenz Curve and Gini Coefficient

Lorenz curve is a fairly widely used simple graphical method of comparing distributions on 2 - dimensional surfaces. Basically it uses a square graph with x - axis and y - axis having comparable scale, e.g., percent units (Fig.). Appropriate data are collected for subdivisions of the total area being considered. If the density of the objects distributed over the area is uniform, a straight-line curve results. It is called the line of equal distribution (LED) or 45° line with the following characteristics : (a) it is simply the SW - NE diagonal of the square graph, (b) it is obtained by joining the origin (0,0) of the graph and the point (100%, 100%), and (c) the slope of LED is + 45°. The degree of inequality of a distribution is directly proportional to the degree of concavity of the curve. Hence, the more the concavity, the more the inequality.



The Gini coefficient (G) is a measure of inequality of a distribution (Gini, 1912). It is defined as a ratio with boundary conditions, 0 = G =1. The numerator is the area between the Lorenz curve of the distribution and the uniform (perfect) distribution line (LED), while the denominator is the area under the uniform distribution line (LED). Here, G = 0 corresponds to perfect equality (i.e. each unit has the same quantity) and G = 1 corresponds to perfect inequality (i.e. only a single unit has all

the quantity, while everyone else has zero). The Gini coefficient satisfies four important principles : *anonymity, scale independence, population independence, and transfer principle*. As a measure of inequality, G has several advantages – (a) it is a measure of inequality by means of a ratio analysis, (b) It can be used to compare distributions across different populations, (c) it is sufficiently simple and can be compared across countries and be easily interpreted, (d) it can be used to indicate how the distribution has changed within a country over a period of time and to see if inequality is increasing or decreasing. G can be calculated from the following formula :

$$G = 1 - \{Ó(x_i.\ y_{i+1}) - Ó(x_{i+1}.\ y_i)\}/10000$$

where, i = 1, 2, 3, ... n and (x, y) are co-ordinates of the points plotted

Example : Draw a Lorenz curve to show the nature of distribution of rural population of 10 Blocks and interpret.

Requirements :

1. A data base with total population and rural population of 10 Blocks
2. A Graph Paper (mm), Calculator, Pen, Pencil, Eraser etc.

Procedures :

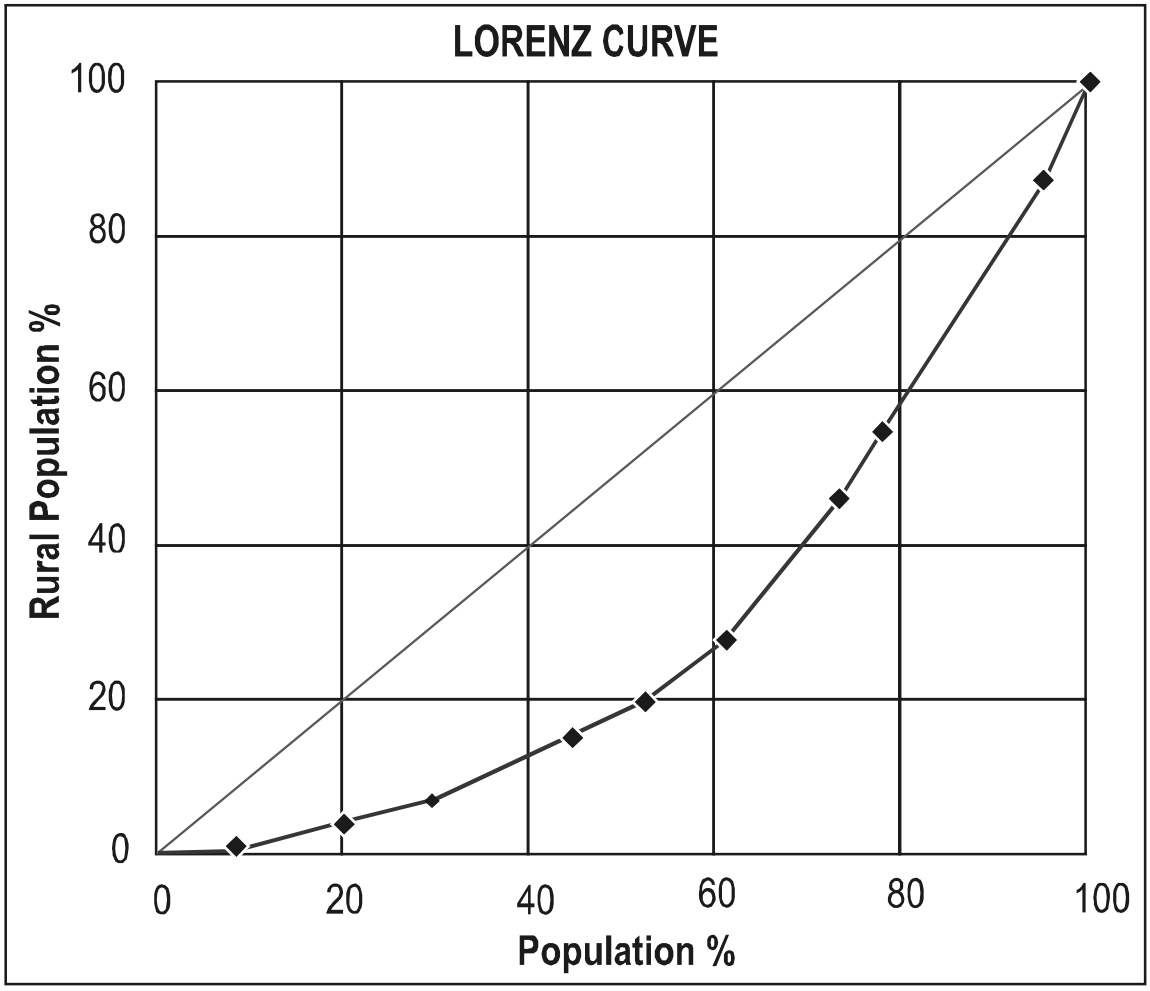
3. It is the 'rural population' of 10 blocks (Bi) of a district (D) for which Lorenz Curve is to be drawn
4. Compute the proportion of 'rural population' (Ri) of a block with respect to individual block total
5. Rank the Ri and redraw the Table according to the ascending rank order
6. Now compute the proportion of 'population' of a block with respect to the district total (BPi)
7. Also compute the proportion of 'rural population' of a block with respect to the district total (BRi)
8. Compute the cumulative frequencies of the BPi (x) and BRi (y) and enter in separate columns

Table – 7 : WORKSHEET FOR LORENZ CURVE

Blocks (Bi)	Population (Pi)	Rural Population (Ri)	Ri= (Ri/Pi) *100(%)	Rank based on % Ri	Redrawn Table			BPi= (Pi/DPi) *100(%)	Cumulative BPi (x:%)	BRi= (Ri/DRi) *100(%)	Cumulative BRi (y:%)
					Rank (ascending	Population (Pi)	Rural Population				
A	6050605	375033	6.19	7	1	3729644	10090	7.55	7.55	0.48	0.48
B	2555664	177501	6.94	8	2	5715030	70499	11.57	19.12	3.34	3.82
C	2805065	289906	10.33	10	3	4740149	61513	9.60	28.72	2.91	6.73
D	8331912	689636	8.28	9	4	7281881	169831	14.74	43.46	8.04	14.77
E	7281881	169831	2.33	4	5	3852097	90525	7.80	51.26	4.29	19.06
F	5715030	70499	1.23	2	6	4335230	176401	8.77	60.03	8.36	27.42
G	3729644	10090	0.27	1	7	6050605	375033	12.25	72.28	17.77	45.19
H	4335230	176401	4.07	6	8	2555664	177501	5.17	77.45	8.41	53.60
I	3852097	90525	2.35	5	9	8331912	689636	16.87	94.32	32.67	86.27
J	4740149	61513	1.29	3	10	2805065	289906	5.68	100.00	13.73	100.00
District Total	49397277	2110935				49397277	2110935	100.00		100.00	

Table – 7a : COMPUTATION OF GINI COEFFICIENT

Blocks	Xi	Yi	Xi . Yi+1	Xi+1 . Yi	Gini Coefficient
G	7.55	0.48	28.841	9.1776	G = 1 – {(25516.19 – 21477.09) / 10000} = 1 – {4039.094 / 10000} = 1 – 0.40 = 0.60
F	19.12	3.82	128.6776	109.7104	
J	28.72	6.73	424.1944	292.4858	
E	43.46	14.77	828.3476	757.1102	
I	51.26	19.06	1405.549	1144.172	
H	60.03	27.42	2712.756	1981.918	
A	72.28	45.19	3874.208	3499.966	
B	77.45	53.6	6681.612	5055.552	
D	94.32	86.27	9432	8627	
C	100	100	Sum = 25516.19	Sum = 21477.09	


LORENZ CURVE
Rural Population %
Population %
0
20
40
60
80
100

3.2. 2 : Z – score values

In statistics, a standard score (also called z-score or normal score) is a dimensionless quantity derived by subtracting the population mean from an individual (raw) score and then dividing the difference by the population standard deviation. It compares the various grading methods in a normal distribution. Two distributions with very different means and standard deviations are difficult to compare closely unless both distributions can be put into a standard form. The conversion process is called standardization. It considers both varying means and varying standard deviations.

The standard score is given by

The standard score is given by

$$z = \frac{X - \mu}{\sigma}$$

where

- X is a raw score to be standardized
- σ is the standard deviation of the population $(= \sqrt{\{\Sigma(x_i - x)^2 / N\}})$
- μ is the mean of the population $(= (\Sigma x_i)N)$
- N = number of districts

The quantity z represents the distance between the raw score and the population mean in units of the standard deviation. z is negative when the raw score is below the mean, positive when above. A key point is that calculating z requires the population mean and the population standard deviation, not the sample mean or sample deviation. It requires knowing the population statistics, not the statistics of a sample drawn from the population of interest.

Z – score values are very important in geographical analysis. It can be used in three ways : (a) to compare the nature of variations, particularly when attributes of more than one sample are compared, and as such to explore the degree of concentration or dispersion of attributes across samples, and (b) by way of this, it can well be used in classificatory problems. The more the value of Z – score, the more it is away from mean, or more it is distinct or specialized in a given pattern of distribution. On a Z – scale, samples may be easily placed for distributional class.

Example : Draw a Z – score map to show the nature of distribution of population of West Bengal, 2001

Requirements :

1. A data base with districtwise total population of West Bengal, 2001
2. Calculator, Pen, Pencil, Eraser etc.

Procedures :

1. Compute the arithmetic mean of total population of the districts
2. Compute the standard deviation of total population of the districts
3. Compute the Z – scores for each district
4. Prepare a distribution table with classes as : (0 ± 1), (1 ± 2), etc and draw choropleth maps and interpret

Note : Isopleth Map with isopleths of Z – scores, e.g., 0, 1, 2, 3, etc can also be drawn and interpreted

WORKSHEET FOR CALCULATION OF Z – SCORES

DISTRICTS	POPULATION 2001 (x)	PARAMETERS	$z = \frac{X - \mu}{\sigma}$
Purulia	2535233	$\mu = (\Sigma x)/N$	–0.80
Bankura	3191822	$= (80221171/18)$	–0.53
24-Paragana(N)	8930295	$= 4456732$	1.87
Jalpaiguri	3403204	$\sigma = \sqrt{((x - \mu)^2/N)}$	–0.44
Coochbehar	2478280	$= 2396161$	-0.83

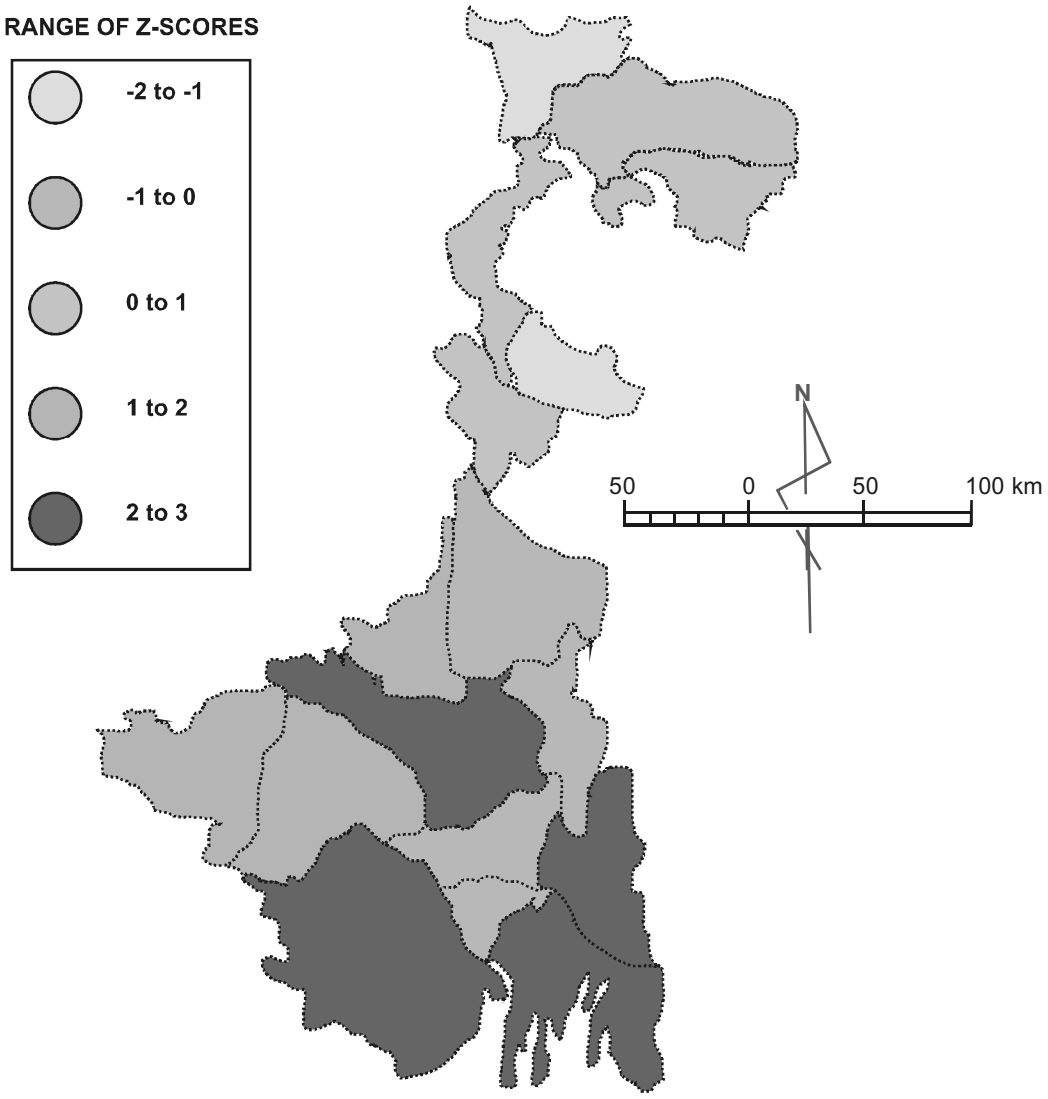
Table – 8 : WORKSHEET FOR Z – SCORES

DISTRICTS	POPULATION 2001 (x)	PARAMETERS	Z-SCORE $= (x - \overline{X})/\sigma$
Purulia	**2535233**	$\overline{X} = (\Sigma x)/N$ $= (80221171/18)$ $= 4456732$ $\sigma = \sqrt{((x - \mu)^2/N)}$ $= 2396161$	**-0.80**
Bankura	**3191822**		**-0.53**
Bankura	**3191822**		**-0.53**
Midnapore	**9638473**		**2.16**
Birbhum	**3012546**		**-0.60**
Burdwan	**6919698**		**1.03**
Nadia	**4603756**		**0.06**
U. Dinajpur	**2441824**		**-0.84**
Malda	**3290160**		**-0.49**
Hooghly	**5040047**		**0.24**
Howrah	**4274010**		**-0.08**
Murshidabad	**5863717**		**0.59**
Darjeeling	**1605900**		**-1.19**
Kolkata	**4580544**		**0.05**
D. Dinajpur	**1502647**		**-1.23**
24 Parganas (S)	**6909015**		**1.02**
24 Parganas (N)	**8930295**		**1.87**
Jalpaiguri	**3403204**		**-0.44**
Coochbehar	**2478280**		**-0.83**
Sum Total =	**80221171**		

Table – 8a : CHOROPLETH TABLE

Range of Z-Score	Districts	Remarks
-2 to 1	Darjeeling, D. Dinajpur	Least
-1 to 0	Purulia, Bankura, Birbhum, Howrah, Malda, U. Dinajpur, Jalpaiguri, Coochbehar	Less
0 to 1	Nadia, Hooghly, Kolkata, Murshidabad	Moderate
1 to 2	Burdwan, 24 Parganas (N), 24 Parganas (S)	High
2 to 3	Midnapore	Very High

DISTRIBUTION
OF
POPULATION OF WEST BENGAL, 2001
BY
Z-SCORE ANALYSIS



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Unit 4 □ Hierarchy Analysis

Structure

4.1 Rank–size distribution of towns

When size is plotted against the rank for every town / city, the relationship (on a logarithmic scale) is shown by a downward sloping straight line (Fig.). This means that city size is inversely proportional to its rank. In other words, the product of the city size and its rank is constant, being equal to the size of the leading city in the system of cities (Auerbach,1913; Zipf, 1949). If all the towns / cities of an area are ranked in descending order of population, the population of the nth ranked town will be one- nth that of the largest one.

$$\text{Thus, } P_r = P_1 . (r)^{-q}$$

where r= rank of a city, P_r = population of a city of rank, r, P_1= population of the largest city and q=an exponent which generally has a value close to 1.

The tendency of the largest city to be "excessively" big with stunting effects on cities of nearby rank is the primate distribution case (Jefferson 1939, Linksy 1965, Harris 1971). According to Richardson (1973) the rank – size distribution may be interpreted as a very general model according to the value of the exponent : q = 1 implies the rank – size distribution, q > 1 represents metropolitan dominance, and q < 1 stands for an urban system in which intermediate cities are relatively large. The limiting cases are : q = infinity (only one city) and q = 0 (all cities are of same size). The rank – size distribution matches well with the allometric growth model and Pareto distribution (Parr, 1970; Berry, 1961; Beckman, 1958; Nordbeck, 1971).

Example : Draw a rank – size graph for the 74 cities / towns of West Bengal, 2001

Requirements :

1. A data base with population of the 32 cities / towns of West Bengal, 2001
2. Log – log graph paper, Calculator, Pen, Pencil, Eraser etc.

Procedures :

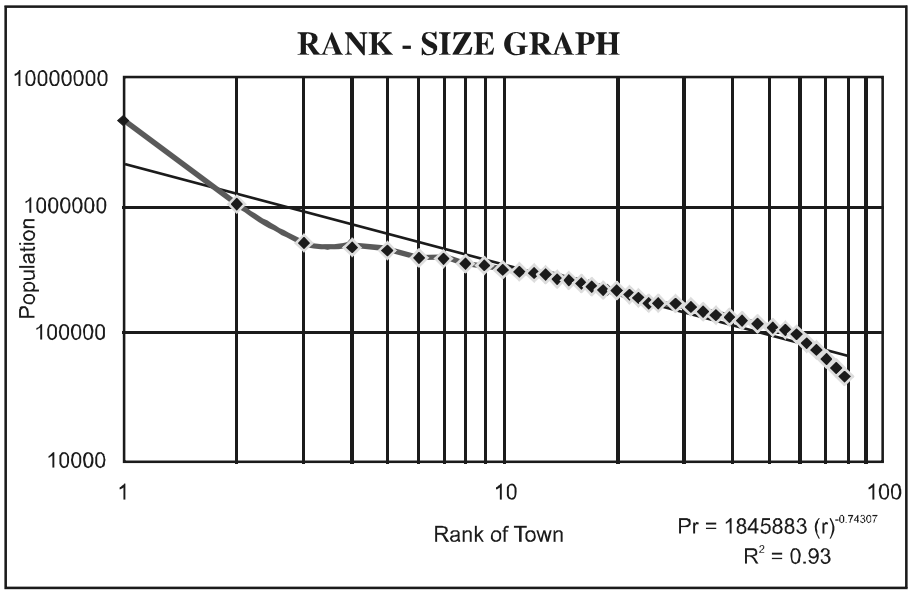
1. Arrange the cities / towns in descending order of their size of population
2. Assign ranks in ascending order so that the 1st ranked city has the largest population size

3. Take a 3 x 2 Cycle Log - log graph paper
4. Plot ranks along the x - axis and population along y - axis
5. Measure the map length of a cycle (d) from the graph in either cm or inch
6. Compute the perpendicular distance (away from the base of a cycle) for either population or rank using formula :

   y (cm or inch) = (log P - log Cb) x d

   x (cm or inch) = (log r - log Cb) x d

   where P = population of a city or town of rank r, Cb = Value of the base of a Cycle in which the required population or rank is to be plotted, and d = map length of a cycle
7. Plot the population of a city / town corresponding to their ranks and join them by lines.



(Fig-9)

Table – 9 : WORKSHEET FOR PLOTTING THE RANK – SIZE CURVE
(Log – Log Graph : Power Regression)

Rank (r)	Population (Pr)	log (r)	log (Pr)	sq. of log (r)	log (r) x log (Pr)
1	4580544	0	6.660917059	0	0
2	1008704	0.301	6.003763743	0.090619058	1.807312974
3	492996	0.4771	5.692843396	0.227644692	2.716176584
4	486304	0.6021	5.686907842	0.362476233	3.423859686
5	441956	0.699	5.645379034	0.488559067	3.945950608
6	392150	0.7782	5.593452219	0.605519368	4.352551838
7	389214	0.8451	5.590188453	0.714190697	4.724257305
8	348379	0.9031	5.542051968	0.815571525	5.00497164
9	336390	0.9542	5.526843077	0.910578767	5.273948607
10	314334	1	5.497391359	1	5.497391359
11	290067	1.0414	5.462498323	1.084498725	5.688605797
12	285871	1.0792	5.456170101	1.164632162	5.888196448
13	284615	1.1139	5.454257785	1.240869792	6.075734201
14	271781	1.1461	5.434219092	1.313609474	6.228310854
15	261575	1.1761	5.417596234	1.38319065	6.371587576
16	250615	1.2041	5.399007061	1.449904933	6.501052289
17	231515	1.2304	5.364579134	1.514004548	6.60084061
18	220032	1.2553	5.342485846	1.575709062	6.706275592
19	215432	1.2788	5.333310213	1.635210772	6.81998964
20	207984	1.301	5.318029926	1.69267905	6.918916452
21	202095	1.3222	5.305555569	1.748263863	7.015107942

Solution of the Rank – Size Equation : $P_r = P_1 (r)^b$

The normal equations are :

$?\log P = N. a + b ?\log r$

$?(\log P. \log r) = a . ?\log r + b ?(\log r)^2$

From Table :

$?\log P = 174.1988872$

$?\log r = 35.42$

$?(\log P. \log r) = 189.6336701$

$?(\log r)^2 = 43.48870256$

Thus,

$174.1988872 = 32 a + 35.42 b$

$189.6336701 = 35.42 b + 43.48870256 b$

Eliminating coefficients of ' a ',

$5.443715225 = a + 1.106875 b$

$5.353858557 = a + 1.122780075 b$

Subtracting and transposing,

$b = - 0.743073$

$a = 6.26620417$

$P_1 = \text{antilog } (6.26620417)$

$= 1845883$

Therefore, $P_r = 1845883 (r)^{-0.743073}$

Table – 9 : WORKSHEET FOR PLOTTING THE RANK – SIZE CURVE *(Contd.)*

Rank (r)	Population (Pr)	log (r)	log (Pr)	sq. of log (r)	log (r) x log (Pr)	Solution of the Rank – Size Equation : $P_r = P_1 (r)^{-b}$
22	197955	1.3424	5.296566476	1.802098654	7.110230968	
23	185660	1.3617	5.268718346	1.854302699	7.174560432	
24	170695	1.3802	5.2322208	1.904983072	7.221569967	
25	170201	1.3979	5.230962107	1.954236268	7.312571214	
26	167848	1.415	5.224916171	2.002149575	7.393117127	
27	165222	1.4314	5.218067875	2.048802225	7.468953275	
28	162166	1.4472	5.209959804	2.094266368	7.539635174	
29	161448	1.4624	5.208032669	2.138607904	7.616216549	
30	160168	1.4771	5.204575753	2.181887201	7.687789466	
31	155503	1.4914	5.191738772	2.224159702	7.742760329	
32	153349	1.5051	5.185680948	2.265476457	7.805227567	
	Total =	35.42	174.1988872	43.48870256	189.6336701	

Table – 9a : WORKSHEET FOR PLOTTING THE RANK – SIZE CURVE
(Arithmetic Graph)

Rank (r)	Population (Pr)	1 / (r)	Computation of Estimated Population of the 1st ranked Town	Computation of Estimated Population of Towns Pr = P_1 / r
1	4580544	1	Estimated Population of the 1st Ranked town / city is given by –	329254
2	1008704	0.5		1646271
3	492996	0.333333333		1097514
4	486304	0.25	P_1 = ?(Pr) / ?(1 / r)	823135
5	441956	0.2	= 13362768 / 4.0585	658508
6	392150	0.166666667	= 3292543	548757
7	389214	0.142857143		470363

Table – 9a : WORKSHEET FOR PLOTTING THE RANK – SIZE CURVE *(Contd.)*

Rank (r)	Population (Pr)	1 / (r)	Computation of Estimated Population of the 1st ranked Town	Computation of Estimated Population of Towns Pr = P_1 / r
8	348379	0.125		411567
9	336390	0.111111111		365838
10	314334	0.1		329254
11	290067	0.090909091		299322
12	285871	0.083333333		274378
13	284615	0.076923077		253272
14	271781	0.071428571		235182
15	261575	0.066666667		219503
16	250615	0.0625		205784
17	231515	0.058823529		193679
18	220032	0.055555556		182919
19	215432	0.052631579		173292
20	207984	0.05		164627
21	202095	0.047619048		156787
22	197955	0.045454545		149661
23	185660	0.043478261		143154
24	170695	0.041666667		137189
25	170201	0.04		131702
26	167848	0.038461538		126636
27	165222	0.037037037		121946
28	162166	0.035714286		117591
29	161448	0.034482759		113535
30	160168	0.033333333		109751
31	155503	0.032258065		106211
32	153349	0.03125		102892
	13362768	4.058495195		

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4.2 : Functional Hierarchy of Towns

As aggregates of human population, towns are devoted to a number of functions, performed by the working section of their inhabitants (Harris, 1943). The number, relative proportion and character of these functions indicate the nature of urbanization in a particular environmental setting. The pattern of functions helps to delineate the regional system of towns/cities along with the hierarchy. Harris (1943) used the proportion of labour force in a particular occupation as the basic criteria for determining the degree of its specialization. Pownall (1953) later modified the scheme by using 'mean' and 'deviation from mean' in finding the 'distinctiveness' of a function. Later Nelson (1955) used the 'mean' and 'standard deviation' to determine the 'degree of distinctiveness' of any function. A town which shows a percentage employment of more than 'mean' plus one 'standard deviation' is said to be significantly characterized by the function diagnosed by the occupation group. This is further developed by recording how many times the employment ratio in one town is above the 'mean' for all towns in terms of the 'standard deviation' (Dick, 1961; Dacey, 1962; Hadden and Borgatta, 1965; Berry, 1972; Ram and Sinha, 1972; Mitra, 1981).

Example : Classify the following towns according to their functions

Requirements :

1. A town data base with occupational pattern of population
2. Graph paper, Calculator, Pen, Pencil, Eraser etc.

Procedures :

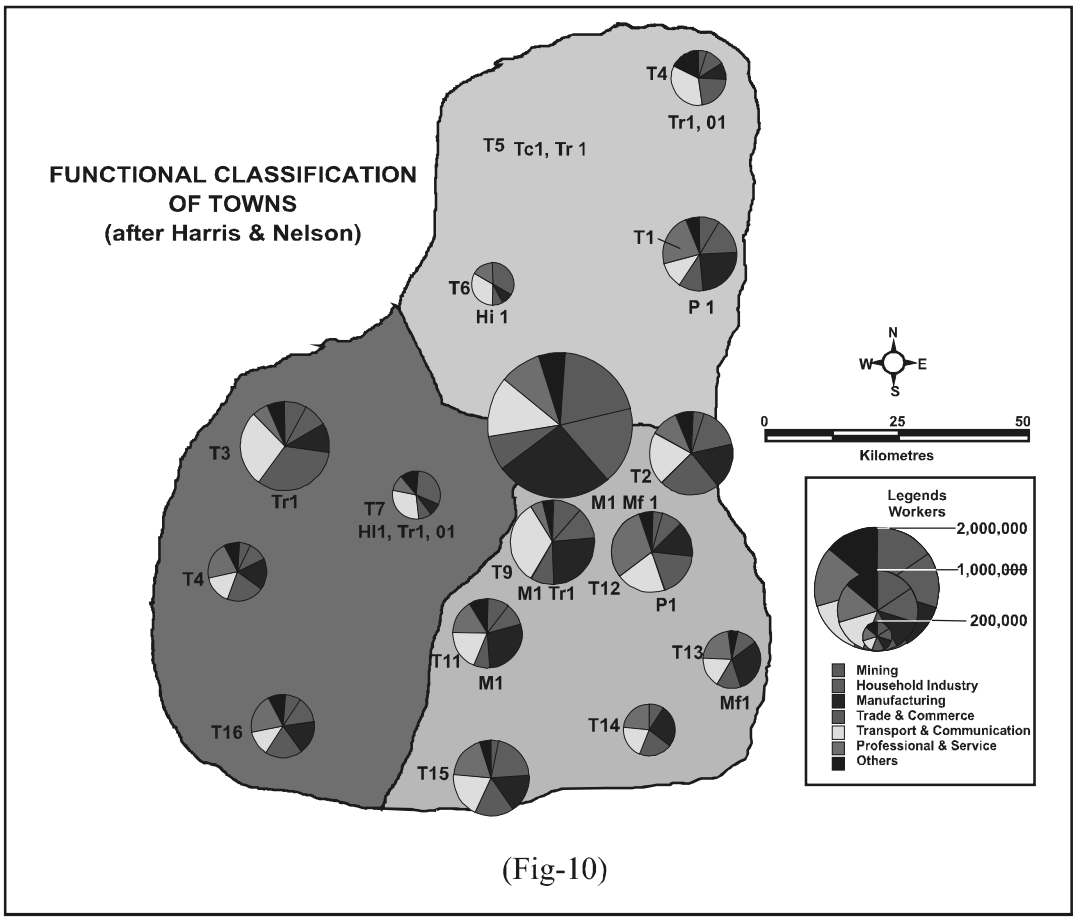
1. Prepare a data matrix with the following columns as shown below –

Towns	Workers (%)			
	Occupation – 1	Occupation – 2	Occupation – 3	Occupation – n
AAA				
BBB				
Mean				
Standard Deviation				

2. Compute the 'mean' of the workers (%) separately for all the occupations
3. Compute the 'standard deviation' of the workers (%) separately for all the occupations
4. Draw frequency curves to show the distribution of workers in different occupations
5. For each occupation prepare separate classificatory tables as shown below –

Occupation – 1	Degree of Specialization	Occupation – 2	Degree of Specialization
Mean to (Mean + 1 SD)		Mean to (Mean + 1 SD)	
(Mean + 1SD) to (Mean + 2SD)	$O1_1$	(Mean + 1SD) to (Mean + 2SD)	$O2_1$
(Mean + 2SD) to (Mean + 3SD)	$O1_2$	(Mean + 2SD) to (Mean + 3SD)	$O2_2$
(Mean + 3SD) to (Mean + 4SD)	$O1_3$	(Mean + 3SD) to (Mean + 4SD)	$O2_3$

6. Assign the 'degree of functional specilisation' to the Towns to complete the process of classification and identification of hierarchy.



(Fig-10)

Table – 10 : WORKSHEET FOR FUNCTIONAL CLASSIFICATION OF TOWNS / CITIES

Towns	Proportion of Workers employed (%)							Nomenclature of Towns
	Mining (M)	Household Industry (HI)	Manufacturing Industry (Mf)	Trade & Commerce (Tc)	Transport & Communication (Tr)	Professional Services (P)	Others (O)	
T1	8.8	16.3	22.2	10.8	12.4	**25.2 (1)**	4.3	P_1 : Service Town
T2	4.5	18.3	16.7	22.3	20.8	12.3	5.1	*Diversified*
T3	7.8	9.8	10.9	**31.6 (1)**	27.4	7.7	4.8	Tc_1 : Trade & Commerce Town
T4	3.9	12.4	8.6	22.9	**34.2 (1)**	9.8	**8.2 (1)**	Tr_1 O_1: Transport Town and Others
T5	2.1	9.6	15.8	**31.8 (1)**	18.7	11.5	**10.5 (1)**	Tc_1 Tr_1: Trade & Commerce and Transport Town
T6	0	**34.2 (2)**	8.2	7.2	**31.2 (1)**	18.2	1.0	HI_1 : Household Industry
T7	0	**32.6 (2)**	6.4	8.5	**30.7 (1)**	11.9	**9.9 (1)**	HI_1 Tr_1 O_1: Household Industry, Transport Town and Others
T8	5.6	9.9	18.4	22.1	18.2	19.6	6.2	*Diversified*
T9	**12.3 (1)**	11.3	24.5	9.5	**34.2 (1)**	6.1	2.1	M_1 Tr_1: Mining and Transport Town
T10	**21.1 (2)**	17.2	**26.9 (1)**	7.3	12.7	11.1	3.7	M_1 Mf_1: Mining and Manufacturing Town
T11	9.7	10.6	**28.2 (1)**	6.9	18.9	18.4	7.3	Mf_1: Manufacturing Town
T12	3.4	8.6	14.4	18.4	20.5	**30.5 (1)**	4.2	P_1: Service Town
T13	2.1	12.7	**30.8 (1)**	12.8	17.2	23.1	1.3	Mf_1: Manufacturing Town
T14	2.5	5.8	23.8	24.4	20.2	22.4	0.9	*Diversified*
T15	3.9	21.5	14.6	16.5	21.1	18.6	3.8	*Diversified*
T16	8.3	15.2	15.4	21.2	12.3	20.6	7	*Diversified*
Mean	6	15.4	17.9	17.1	21.9	16.7	5.0	
Standard Deviation	5.4	8.1	7.5	8.5	7.4	6.9	3.0	

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