

CHAPTER-I

Introduction

1.1 Introduction

The term 'rural development' connotes both the economic betterment and greater social transformation of people living in the rural areas. It is the process leading to sustainable improvement of the quality of life of the rural masses. This reflects the multidimensional nature of rural development comprising of the increase in real per capita income of the rural people, improvement in distribution of income, political and economic freedom, and equitable access to resources, education, health care, employment opportunities and justice (Singh, 1999).

Rural development is necessarily an aspect of planned development launched by the Government of India in terms of various programmes formulated in the Five Year Plans of national development. It helps in reducing rural poverty through special income generated programmes with an objective to help the rural people in improving the standard of living. Thus, assessment in the level of rural development is important as it is viewed as an essential part of national development. The word development has many facets and therefore it carries a wide variety of meanings. Development of rural area not only signifies the entire development of an area, but also it emphasizes upon development of the people living in the rural areas. The objectives of development involve the improvement in the level of income with an expansion of the employment opportunity, equality in distribution of the benefits of economic growth, social advancement and environmental conservation. Thus, sustainable development means an activity or a series of activities or process that leads to an improvement in the material well-being of the rural people, without declining over time.

In the Indian context, rural development assumes greater importance as 68.84% (Census, 2011) of its population live in rural areas. Since independence the plans and policies of India emphasized rural development and will continue to do so in future. Fundamentally, the focus of planning is to improve the economic and social conditions of the weaker sections of the rural areas. Thus, eradication of rural poverty and economic growth became the significant objective of the planning process under rural development. In India, initially the planning strategy began with the development of agriculture and allied activities and subsequently the strategies of rural development expanded to raise the employment opportunities for the rural masses by integrating manpower resources, infrastructure and organizational development measures.

The word rural essentially means an area, which is differentiated from the urban in terms of spatial distribution of population, population density, and occupational structure. Despite the expansion of the social and economic provisions available to the people yet the rural areas are confronted with a number of problems. Though, considerable efforts were made at the past and at present, yet the rural poor continue to live in extreme poverty. Jalpaiguri district being a predominantly rural region is of no exception. The rural area has low range of income, high proportion of Scheduled Castes with 56.64% and Scheduled Tribe population with 21.14% affecting the socio-economic structure of the area, poor communication system, low irrigational facilities and an urban population of 31.61% (Census, 2011).

Thus, rural development is a broader concept and is concerned with the overall development of a rural area as a whole. Therefore, a study on the level of rural development is found to be logical where an attempt has been made to analyse whether the infrastructural provisions are adequate to meet the large scale rural population and an analysis of demographic, social and economic aspects demands greater attention.

1.2 Statement of the Problem

In India, rural area development has been at the focus of development strategies since the initiation of the planning era. To reduce inequalities among the rural poor various developmental programmes were introduced. In spite of many efforts, the problems of low literacy rate, low per capita income and inadequate infrastructure has been the major concern for the developmental planners. But the degree of development varies from one rural area to another. A single rural area neither flourishes in every respect nor lags in all aspects in terms of social, economic and infrastructural sectors. The same holds true for Jalpaiguri district. There are some rural areas within the district which are associated with multifaceted problems and therefore assessment of the level of rural development becomes the main reason for the necessity of this research.

Access to urban areas and poor nature of transportation are among the most serious constraints in the rural areas. Inadequate health care facilities, scarcity of pure drinking water, sometimes even acute shortage of water, lack of provision of adequate electric power, poor communication system are further aggravating the problem. Sanitary conditions are poor and are therefore not favourable to healthy living. Besides, inadequate higher educational institutions, low literacy rate of the females, high rate of indebtedness to private moneylenders, lack of hundred days of employment under NREGS along with non-payment of minimum wages are some of the acute problems of the locality. Further, lack of large scale

industrial development hinders the level of rural development, causing the rural youths to migrate urban areas in search of better employment opportunities. However, besides these problems, the problem of awareness among the rural masses cannot be ignored.

Table 1.1: Total rural population and households of Jalpaiguri district

Subdivision	Total population		Rural population		Total households		Rural households	
	2001	2011	2001	2011	2001	2011	2001	2011
Sadar	1553175	1811885	1176622	1123592	318720	410305	256581	323840
Mal	510423	569711	487205	505199	102229	122768	97227	116835

Source: Census of India, 2001, 2011

Table 1.1 reveals the rural population and households in Jalpaiguri district and it is observed that the rural population of Jalpaiguri Sadar sub-division have slightly decreased from 11,76,622 in 2001 to 1123592 in 2011, whereas in Mal sub-division the data reveals that the rural population have slightly increased from 487205 in 2001 to 509199 in 2011. The number of rural households has increased in the entire district covering both the subdivisions from 2001 to 2011. Rural development is the base on which the future of economic development stands.

An attempt has been made in the thesis to find out the degree of rural development in the study area and to identify whether the infrastructural provisions are adequate to meet the large scale rural population. Further, the study on the level of rural development has been elaborated by highlighting the demographic characteristics, level of literacy rate as an important indicator in terms of social infrastructure, the economic structure of the rural areas, the essence of the implementation of the developmental schemes and its impact assessment, and people's awareness on the level of rural development. This has been done empirically on a household level survey on the selected villages and would be highly worthwhile, as an attempt has been made to portray the glaring issues of rural development in the study area.

1.3 Review of Literature

A review of some relevant literature related to rural development has been used for the present research work. A careful study of concerning literature of the past helps the researcher to understand the research issue more precisely. A number of scholars and researchers have studied the issue of rural development with specific objectives and expresses their findings in the past and at present.

Hemlata Rao (1984) in her book 'Regional Disparities and Development in India' has examined the regional disparities in Karnataka. She identified the differentially developed regions, in order to analyze the homogeneous regions with respect to agriculture, industry and

infrastructural facilities and also identified the backward regions which are crucial for the implementation of various regional plans. She suggested that regional disparities could be reduced with the help of integrated regional development plans.

Archana Gaur (1985) in her book 'Integrated rural area development: a case study of a tehsil' makes the regional analysis of the available resources and framed the rural area development plans on the basis of resources, giving focus on the agricultural, animal, industrial and human resources. The author makes a detailed analysis of the socio-economic infrastructure in the forms of public health, rural housing, educational facilities, rural finance, marketing, electrification and rural transport and communication. She also attempts to identify the growth of service centres and elaborates its strategies in the tehsil using composite indicators in order to assess the level of development.

K. V. Sundaram and S. N. Mishra (1985) in their book 'Rural development capitalist and socialist paths' examines the impact of the policies, programmes, weaknesses, approaches and strategies at various levels in India and gave suggestions to rejuvenate India's vast rural hinterland. The authors have recognized a number of parameters to analyze the levels of India's development such as, population growth, employment, agriculture and the patterns of change, social services, quality of life, improvement in science and technology, development in industry in order to make an overall assessment. Based on such parameters the authors have also made an intensive study of Saraon tehsil in Allahabad district emphasizing the social and economic infrastructure, various facilities, developmental programmes and the structure of the village administration.

R.B.P. Singh (1986) in his book 'Social welfare for rural development: a case study' makes a detailed analysis of the socio-cultural provisions of the study area. The author has highlighted the quality of population, their living conditions identifying the social and cultural needs of the region. He also traced the existing factors essential for economic development and cultural advancement emphasizing the transport and communication facilities, marketing and service centre facilities. Various statistical methods have been used as for example correlation coefficient method and spearman's rank correlation method to find out the relationship between different parameters. Finally the author suggested plans and evaluated the different developmental programmes in the study area.

Barkat-e-khuda (1988) in his book 'Rural development and change: a case study of a Bangladesh village' conducted an in-depth micro-level study of a Bangladesh village, Sreebollobpur. He studies the major three aspects of change such as; the economic aspect including the labour force, division of labour and the agricultural development programmes

which results in the expansion of yield per acre along with employment opportunities of the villagers. Then, in the social aspect he includes the literacy, education, rural institutions, the family and the power structure. Lastly, in the demographic aspect he includes the changes in population, marital status, age at marriage, family planning and fertility, concluding Sreebollobpur to be a developed village.

R.C. Srivastava and Jawad Ali (1992) made an attempt to analyse the transportation structure by measuring the density, accessibility, the degree of connectivity of roads and the spatio-temporal distribution of markets in the patha area of Bundelkhand. After a systematic analysis and observations regarding the problems of transport and marketing in the area, the author suggests some valuable measures to achieve a sustainable rural development of the backward area.

Anjana Desai (1992) opines that the major aspect of development of a region is not only the economic growth but also the socio-cultural aspects which are inter-dependent with the economic sector of a region. She identifies the problem of measuring the non-economic variables of development along with the problems of implementation of developmental programmes in rural areas. She identifies the uniqueness of Dangs district in south Gujarat and observes the area as economically poor with its low socio-cultural conditions. The tribals suffer from acute poverty, unemployment, low productivity of food grains and shortages of utility facilities. After analyzing, the author has given a number of remedial measures to improve their quality of life.

I.S. Chauhan and V.S. Bias (1995) in their book 'Social structure and rural development' have made an attempt to analyze empirically the relationship between social structure and rural development along with the availability of infrastructural facilities in the less developed Rajgarh district of Madhya Pradesh. He evaluated the major rural developmental programmes in the study area and examined the influence of existing administrative structures upon rural development. The author puts emphasis on the major rural problems such as poverty, inequality, indebtedness and highlighted the influence of the social parameters on families below poverty line. Assessing the beneficiary families, he observes the social and economic development of the families below poverty line.

Katar Singh (1999) in his book 'Rural development- principles, policies and management' discusses his own ideas and observations regarding the meaning, objectives, measures and determinants of rural development. The author deals with the various rural developmental policies and its models followed in India. He also includes the various aspects of rural development such as planning, organizing and financing rural development along

with the implementation, monitoring and evaluation of the developmental projects. The author contributed the basic concepts and connotations towards rural development.

J. Krishnamurthy (2000) in his book 'Rural development- challenges and opportunities' conducted a comparative analysis of the villages between a developed and less developed block of Chidambaram district, Tamil Nadu. The author reveals that the agricultural development is a process of social transformation. Further, the author emphasizes the socio-economic variables such as occupation, land-holding, workforce, education, infrastructure, and level of people's awareness, participation and utilization of the developmental programmes for a sustainable rural development.

R. K. Raul (2003) in his book 'Rural development in India- approaches and applications' attempts to study the level of rural development in north eastern states. The author has empirically assessed the impact of poverty eradication programme in Karimganj district of Assam. Raul has intensively examined the sampled households based on the per capita income gap from the poverty line, income level and the infrastructural facilities available in the district. The author emphasized and evaluated the employment programmes implemented in the study area and assessed the level of family income from the pre-assistance to post-assistance period and concludes the progress of the rural developmental programmes in terms of the economic development of the area.

Meeta Krishna (2003) in her book 'Poverty alleviation and rural poor' critically examines and evaluates the poverty alleviation programmes implemented in Sahibganj district, Bihar. The author analyses the relevant problems of the rural people and the measures taken to improve the livelihood condition of the people evaluating the employment generated programme. Further, the author pleads for an integrated rural development programme essential for the balanced growth of the study area and suggested measures for accelerating the implementation of the poverty alleviation programme.

M. L. Dhawan (2005) in his book 'Rural development priorities' studies firstly the goals of rural development through good jobs and diverse markets, quality housing, modern community facilities and affordable utilities. The author viewed that the reduction of poverty in the rural sector is through agricultural and economic growth. Dhawan analyses that, development in the village level can be achieved through institutional subsidies in the key areas, which will develop the micro financial infrastructure. The author finds that rural development can be achieved through peoples participation but poverty, migration, illiteracy and inadequate infrastructural facilities affects negatively in the development of the rural sector.

P. Gopinath Rao (2006) in his book 'Rural Development: sustainable livelihood and security' deals with the approaches of sustainable livelihood in terms of rural development. He identifies the inter-relationship between the agricultural growth, employment and rural poverty. The author highlighted the rural developmental policies in the field of food security, employment, education, electrification and information and communication technology and the participation of women in rural development. However the author thought that the declining effort for agriculture is responsible for the poverty of rural people and can be reduced through external support.

K.B. Nayak (2008) in his book 'Rural development and underdevelopment an interdisciplinary study' empirically studies the Kalahandi-Nawapara district of Orissa in order to understand the multi-dimensional problem of poverty and underdevelopment in the interior parts of the country side. The author assessed Bhaisadani village and analyzed the socio-economic conditions of the rural people along with the contributions of the poverty alleviation programmes estimating the creation of assets. He observes that though changes occurred in the quality of life of the rural people yet poverty is a major problem among the small, marginal and landless labourers. The author provides suggestions and strategies to improve the condition of the village.

Jyoti Prakash Sharma and P.R. Sharma (2009) attempted to analyse the level of rural development as a geographical study in Mohania block, Bihar. They observed a relation between the problems of rural development and the ecological factors caused by the depletion and exploitation of natural resources. Proper statistical analysis have been used to find out the level of development and the regional variation among the villages based on a list of variables emphasizing the demography, agricultural activities, infrastructures and amenities.

Mumtaj Ahmed and Shamshul H. Siddiqui (2009) bring out the dimension of rural environmental condition of the Sant kabir nagar district, UP. The authors find out that the rural environment consists of various components and is governed by the physical, socio-economic, political, and infrastructural aspects of the rural areas which play an important role in the quality of life of the rural areas.

Giyasuddin Siddiqui and Sandip Tah (2009) throw light on the impact of socio-cultural and infrastructural factors on the level of rural development in south east Bardhaman district. The authors observe that there exists a positive correlation between the degree of infrastructural provisions and levels of development of an area.

Rukhsana (2009) analyzes the regional imbalances in the dimensions of rural development in western UP identifying the spatial variation of agricultural, industrial and

infrastructural development. The author reveals the level of rural development and observes that the agricultural development in the central and northern part of the study area is positively correlated with industrial development and the infrastructural development of the western parts of the study area. The author further examined the relationship between variables of rural development on the basis of correlation matrix.

S. B. Golahit (2010) in his book 'Rural development programmes in India- problems and prospects' discusses the various rural development programmes in India covering the objectives, strategies, administration, performance and weaknesses of the programmes and also evaluated the programmes in order to find out the impact upon the beneficiaries.

Biraj Kanti Mondal (2010) identifies the role of NREGS on poverty alleviation of Panrui, Birbhum, W.B. The author highlighted the salient features, improved benefits, involved organizations and the type of works under the scheme. After a systematic analysis the author finds that the scheme is beneficial for the rural poor, where a number of unskilled labourers are provided work and the wages are sufficient for the nutritional attainment enhancing the livelihood security of the rural masses.

Arindam Laha and Pravat Kumar Kuri (2010) laid the importance of agrarian institutions in the field of rural development in Burdwan district. They considered the institution of tenancy and credit for the economic well-being of the rural people. According to them the system of tenancy ensures an equal distribution of operational holding while credit facilities provide livelihood security to the rural people ensuring a positive correlation between the land ownership pattern and accessibility to credit facility. Thus the authors wanted to combine the two agrarian institutions to achieve a sustainable rural development.

S.K. Dikshit and Ashutosh Rai (2011) discuss the dimensions and approaches of rural development in India highlighting the developmental plans. According to them the agricultural growth is the important parameter of rural development which requires the infrastructural facilities, institutional transformation and creation of skilled man power.

Rajendra Suryawanshi and Nandkumar Sawant (2011) makes an attempt to analyse the regional disparity and level of development in the rural areas of Thane district, Maharashtra, using the physical, demographic, social and economic variables. The authors calculated the composite scores and categorized the area from low to very high observing that ruggedness, low population, low demand and industrial backwardness, are responsible for the deprivation of the level of rural development.

Manoj Siwach and Prem Kamboj (2011) attempted to examine the performance of NREGS in the two districts of Haryana on the basis of fund utilization, distribution of

expenditure, provision of employment to the rural people and the nature of work. The authors examined the declining level of total employment generation of the semi-skilled and skilled labourers and partial utilization of the available funds under the scheme and put forward some suggestions regarding the utilization of the fund in order to create the productive assets in the rural areas.

Atunu Sarkar and Sujit Das (2012) present the scenario of the integrated rural development in Bankura district. The researchers reveal that the backwardness of the district is due to some crucial problems of poverty, low growth and productivity and lower per capita income. Therefore major importance should be given to these parameters in order to develop the agriculture through development in irrigation facilities, non-farm employment through small and cottage industries and development in social and infrastructural sectors.

B. M. Dash and Sanjoy Roy (2012) in 'new directions in rural development' reveal the contribution of the scholars in the field of various aspects of rural development. The contributors to this edition highlighted the meaning and scope of rural development along with planning; opportunities, strategies of rural marketing initiatives; an empirical study in west Bengal regarding the static and dynamic gains of micro-finance; the opportunities and challenges of NREGA; the impact of globalization on development of rural economy of India through diversification in agriculture.

Amit Kumar notes the performance of NREGS (2012) from two perspectives firstly the opportunities of the programme and then the challenges imposed by the scheme to achieve the target of empowerment of rural poor. He identifies that the scheme is significant as it provide hundred days of employment to the rural households reducing poverty and raising the rural economic growth. The author also makes an assessment of the scheme where lack of work and non-payment of minimum wages to the rural people are found to be the most serious constraints in the level of progress of the scheme in the field of rural development.

Dr. Y. Ashok Kumar and P. Venugopala Rao (2012) have examined the progress of self-help group movements in the field of rural development. They analysed that the credit given to the poor by the organized financial institution was inadequate and the informal credit sources have further deteriorated the economic well-being of the rural poor whereas the self-help group movement acts as an instrument of social change through credit facilities and economic well-being. It shows improvement in rural sector through betterment in social infrastructure and economic activities.

Mosfudar Rehman and Uma Sankar Malik (2013) studies, that infrastructural development plays a crucial role in the process of a balanced regional development in India. The authors highlighted the programmes for the growth of rural infrastructures during the plan period in various sectors like irrigation, power, transport and communication, education, public health and other social services.

Rajender Singh and Sarfaraz Asgher (2014) have studied the overall development of Jammu district at village level in a spatial perspective on the basis of infrastructure, education, demography and agriculture. The result of analysis obtained through composite index of overall development shows that the amenities in the villages are unevenly distributed and the high levels of development are registered in the villages of administrative headquarters whereas the northern villages located in the rugged topography are lagging behind in the level of development.

Chandrima Sen and Sumana Bandyopadhyay (2014) attempts to examine the empowerment of women through participation in the micro-finance programmes for a better access to credit facility, in Bagnan 1 block of West Bengal. Using the decision index for the analysis of women's involvement in decision making at household level, they allot ranks and further observed that a large proportion of women are benefited from the credit facility leading to a greater levels of economic independence with an increase in the confidence level, and the motivators acts as catalysts in the process of their empowerment.

S. Thanikasalam and Dr. S. Saraswati (2014) highlighted the features of 73rd Amendment Act and its impact on the village governance or the Panchayati Raj system. The basic amenities and the various facilities available in the Ussilampatti block have been analysed and the villagers were interviewed on the basis of satisfactory level about basic amenities initiated by the government.

1.4 Objectives

The present study attempts to find out the level of rural development and therefore the aims and objectives of the study are:

1. To analyse and measure the disparities in the level of rural development amongst the blocks.
2. To identify and evaluate the level of rural development in terms of infrastructural facilities.
3. To examine the social infrastructure and economic indicator of the study area and its reflection in rural development.

4. To evaluate the existing income generated rural development programmes implemented in the study area and to correlate it with the level of rural development.
5. To identify the problems of the study area in the way of rural development and suggest appropriate remedies.

1.5 Hypothesis

The entire study has been made on the basis of the following hypothesis:

1. Infrastructural facilities are inadequate to meet the requirement of the large scale rural population concentration.
2. The higher the level of literacy rate among the females the better is the economic growth in the rural households.
3. There is a significant rise in the level of family income and the per capita income from the pre-assistance period to post-assistance period.
4. Enhancement in generating alternative sources of employment varies in the remote villages and the villages adjoining to municipal areas.

1.6 Methodology

Methodology is the crucial part of every research work which helps to analyze the problems raised during the research work under the requisite number of terms. Methodology is a process adopted by the researcher for the fulfillment of the objectives mentioned above, in order to reach at a valid conclusion through precise and empirical explanation of the research work. In the present study, the major focus is on the assessment of the level of development in the rural areas and to measure the disparities amongst the blocks of Jalpaiguri district. The framework of the methodology for the present study is divided into the following three phases:

- Pre-field work
- Field work &
- Post- field work

The pre-field work includes the reconnaissance survey and planning of the entire research design. In this stage the relevant review of literature related to rural development and the knowledge of background are necessary in order to substantiate the study. The formulation of objectives and hypothesis along with the sources from where the data has been collected were also framed out.

Field-work involves the necessary collection of data through primary and secondary sources. Primary data has been collected personally through rigorous field survey at a

household level with the help of a household schedule containing a set of questionnaire through a direct communication with the villagers. The questionnaire survey was carried out to collect information from the schools, Sishu Siksha Kendras, Madhyamik Siksha Kendras, Anganwadi centres regarding the number of students, teachers, infrastructure of the institutions and the mid-day meals. The survey was also carried out in order to collect information regarding the demographic, social, economic condition of the households as well as the provision of the infrastructural facilities and the impact of the rural development programmes and policies upon the rural households.

Since, it becomes difficult to enumerate every household having a large number of population spread over a wide geographical area, the technique of sampling will reduce their number. A suitable sample size has been chosen for the field observation and on the spot data collection. There are different methods of sampling which ensure better representation under different situations. For the study, multi-stage random sampling technique without replacement has been applied considering the nature of the region. In the first stage, 7 CD Blocks of Jalpaiguri district has been considered as an independent sampling unit. In the second stage, 10% villages of the total inhabited villages of the Gram Panchayat have been selected from each CD block. The remote villages of the block and the villages to the nearest town has been prioritized and taken into consideration. In the third stage, from each inhabited village 5-10% of the total households have been taken as a sample randomly in order to avoid biasness. Therefore, a household level questionnaire has been used for conducting the household survey and to generate data relating to the level of development. Table 1.2 reveals that the total number of sampled villages has been 40 out of the total 391 inhabited villages in Jalpaiguri district.

Table 1.2: Sample Size of Villages and Households of Jalpaiguri District

Sl. No.	C.D. Block	Total Number of inhabited villages*	Sample size of villages**	Sample size of households**
1	Rajganj	26	3	65
2	Jalpaiguri	28	3	59
3	Maynaguri	79	8	176
4	Dhupguri	98	10	209
5	Mal	100	10	200
6	Matiali	27	3	40
7	Nagrakata	33	3	81
8	Total	391	40	830

Source- *Census of India, 2011 and
**Computed by author

Apart from the primary data, the secondary data has been collected from Gram Panchayat Office, Block Development Office, District Rural Development Cell, District Magistrate Office, Zilla Parishad and some of the other government offices, District Census Handbook, District Gazetteer, village directories, West Bengal Human Development Report, Statistical abstract published by Bureau of Applied Economics and Statistics of the Government of West Bengal, published data from the state institute of Panchayat and Rural Development and some other officially published and unpublished records, maps like district map with block boundaries of selected regions has been consulted. Library work has been done by visiting a number of libraries for all the relevant literature concerning the work. For the present research work maps and photographs that displays the rural areas of Jalpaiguri district has been used. The maps have been prepared using the GIS software, Arc GIS (9.1 version) to enhance the presentation of the statistical results by providing a visual impact to the research work. For the description and analysis of the work cartographic representation has been used which covers choropleths, bar diagrams and the pie diagrams.

After the completion of the collection of both primary and secondary data, relevant information has been checked, edited, coded and tabulated in a suitable form applying statistical analysis with R-software (version 3.1.6) and Microsoft excel. Accuracy assessment of the data has been done to bring out a number of valuable geographical results. In the analysis both simple and standard statistical techniques has been used to infer the ground facts. The methodologies that have been adopted for the research work are as follows:

1. Population Growth rate = $\frac{\text{Present Population} - \text{Previous population}}{\text{Previous population}} * 100$
2. Population Density = $\frac{\text{Total Rural Population}}{\text{Total Rural Area}}$
3. Decadal variation in population density = present rural population density - previous rural population density
4. Sex ratio = $\frac{\text{Number of females}}{\text{number of males}} * 1000$
5. Gender Disparity Index in literacy rate (Di) = $\text{Log}(X2/X1) + \text{Log}[(200-X1)/(200-X2)]$
 Where, Di is the disparity index
 X1 denotes female literacy rate
 X2 denotes male literacy rate
6. Dependency ratio = $\frac{p0-14+p60}{p15-59} K$
7. Effective Literacy rate = $\frac{\text{Total literates}}{\text{Total Population (7 years and aboves)}} * 100$

8. Male Literacy rate = $\frac{\text{Total male literates}}{\text{Total male Population (7 years and aboves)}} * 100$
9. Female Literacy rate = $\frac{\text{Total female literates}}{\text{Total female Population (7 years and aboves)}} * 100$
10. Room Density = $\frac{\text{Total Rural Population (sampled households)}}{\text{Total Number of Rooms}}$
11. Road Density = $\frac{\text{Total surface road length (km)}}{\text{Total Rural Area}}$

12. Z' score: In order to reach on standardization, the raw data for each indicator has been computed into standard scores. The 'Z' score or standard score technique for each indicator has been calculated. Further, composite standard score has been used to assess the disparities in the level of rural development in the study area. *Standard score is a dimensionless quantity that involves both varying means and varying standard deviation. Therefore, it can be suitably used to examine the pattern of regional distribution of a variable* (Sarkar, 2013).

Thus Z score technique is computed from the following equation:

$$z = \frac{x - \bar{x}}{SD}$$

Where, Z is the standard score
 x is original values of the score
 \bar{x} is the mean of variables, and
 SD is the standard deviation of variables

The composite Z score for each unit of the study area is expressed as:

$$CSS = \sum z_{ij} / N$$

CSS denotes composite standard scores
 z_{ij} indicates the sum of z scores of indicators j in the area i
 N is the number of variables

13. Student t-test was applied to find out the significance of the determinants at 5 percent level of significance (l.o.s).

The test statistic for Student's t – test is given by

$$\text{Students t – test} = t = \sqrt{\frac{r(n-2)}{1-r^2}}$$

14. Chi-square test - Chi – Square (χ^2) = $\sum \frac{(O_{ij}-E_{ij})^2}{E_{ij}}$

Where, O_{ij} = observed frequency of the cell in ith row and jth column
 E_{ij} = expected frequency of the cell in ith row and jth column

15. Welch Two Sample t- test-

$$t\text{-statistic} = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{S_1^2 + S_2^2}{n_1 + n_2}}}$$

In Welch Two Sample t- test, standard error has been calculated through sample standard deviation:

$$SE = \sqrt{\frac{S_1^2 + S_2^2}{n_1 + n_2}}$$

Where, 1 and 2 are the two groups,

\bar{x}_1 and \bar{x}_2 are the sample means of groups 1 and 2,

μ_1 and μ_2 are the two population means,

S is the standard deviation of variables,

n is the sample size of groups, and

SE is the standard error and in order to get the p-value from the t- statistic, t- distribution tables have been used.

16. Paired t- test: to calculate the paired t-test, the following steps have been used.

i.) $d_i = y_i - x_i$

Where, d_i is the difference,

y_i is the test score after the assistance,

x_i is the test score before the assistance,

ii.) \bar{d}

Where, \bar{d} is the mean difference,

iii.) $SE(\bar{d}) = \frac{S_d}{\sqrt{n}}$

Where, S_d is the standard deviation of the differences,

$SE(\bar{d})$ is the standard error of mean difference,

iv.) $T = \frac{\bar{d}}{SE(\bar{d})}$

Where, T is the t-statistic,

v.) in order to get the p-value for the paired t-test, t-distribution tables has been used.

17. ANOVA two-way model: to calculate the ANOVA two-way, the following steps have been used (Kothari, 2011).

i.) T is calculated firstly by taking the total of the values of individual indices,

ii.) Correction factor- $\frac{(T)^2}{n}$

iii.) Sum of squares deviation- $SS = \sum X_{ij}^2 - \frac{(T)^2}{n}$

Here, the square of all the individual indices has been calculated and then its total has been computed. To get the sum of squares deviation the correction factor has been subtracted from the total value.

- iv.) To calculate the SS between columns, the total of the individual columns along with the square of each column total has been calculated. After this computation, the squared values of the individual columns are divided by the number of indices in the column. Besides, to get the SS between columns, the correction factor has been subtracted from the total value.
- v.) To calculate the SS between rows, the total of the individual rows along with the square of each row total has been calculated. After this computation, the squared values of the individual rows are divided by the number of indices in the row. Besides, to get the SS between rows, the correction factor has been subtracted from the total value.
- vi.) SS for error variance- (SS between columns+ SS between rows)
- vii.) Degrees of freedom-
For variance between columns, it is calculated as (c-1), for variance between rows, it is calculated as (r-1), for error variance, it is calculated as (c-1) (r-1) where, c is the number of columns and r is the number of rows. Using the following steps the ANOVA table has been framed (Kothari, 2011).

Thus, with the application of the relevant statistical techniques along with the utilization of GIS software, the assessment of the level of rural development in terms of demographic, social, economic and infrastructural parameters the research work has been done.

Finally the post-field work comprises the preparation of tables, proper analysis, description and representation of data by the cartographic techniques. Thorough interpretation of the findings has been done in order to prepare proper and final report writing. Finally these techniques have been helpful in drawing proper conclusions so as to provide corrective measures for the development of the study area.

1.7 Research Design

The study has been designed into the following nine chapters keeping in view the objectives of the study in order to understand the assessment of the level of rural development in Jalpaiguri district, West Bengal. A detailed account of the research framework has been presented below:

Chapter I present the introductory part of the research. It gives a brief description of the statement of the problem of the inhabited villages of Jalpaiguri district. The chapter outlines the objectives, the research hypothesis, data sources, the sampling design, the methodology adopted through various statistical techniques for the entire research work and the literature reviews on the issues relevant to rural development.

Chapter II briefly traces the historical background of Jalpaiguri district. It presents the origin and the geographical extent of the district. Further it deals with the geographical background of the study area through the account of the physical and cultural set-up of Jalpaiguri district.

Chapter III is concerned with the meaning, concept and definition of rural development. The chapter discusses the history of rural development and a brief description of the five year plans and programmes. The chapter also discusses the conceptual framework of rural development and points out the scope and importance of the process of rural development. It briefly describes the state government schemes for the empowerment of women in West Bengal.

Chapter IV presents the demographic characteristics of rural Jalpaiguri district. The chapter is devoted to the study of the different demographic components of population like spatial variation in the distribution of rural population, the trend of growth rate of rural population, population density, sex ratio and the literacy rate. The study computes the gender disparity in terms of literacy rate in Jalpaiguri district. The occupational structure, population composition by religion, ethnic structure, age sex composition and the dependency ratio have also been discussed in this chapter. Z score has been applied in order to analyse the level of demographic development in the study area.

Chapter V deals with the social structure reflecting the rural development of Jalpaiguri district. It highlights the educational institutions, the student-teacher ratio, student-school ratio in order to describe the quality of education in rural areas of Jalpaiguri district. The level of literate population and the level of female literacy along with the awareness of women on social and economic issues have been highlighted. The research hypothesis that the higher the level of literacy rates among the females the better is the economic growth of the rural households has been tested with the application of chi-square test. Besides, the chapter deals with the detailed account of the health care facilities, the housing structure, and the sanitation facilities in order to measure the socio-economic status of the rural households. Using z-score, the level of social development in rural areas of Jalpaiguri district has also been measured in this chapter.

Chapter VI presents a detailed account of the economic structure of the study area which includes the size of land holding along with the area under non-agricultural uses, the cultivated area and the area under different crops at a point of time. Two-way ANOVA model has been applied to examine whether there is a significant variation in the crops and in the blocks of Jalpaiguri district. The chapter gives an account of the earning population and

the chemical fertilizers and bio-fertilizers used for intensive cultivation. Further, a detailed account of the households using different sources of irrigation and the distribution of livestock in the study area has been discussed. Besides, the different category of labourers, their place of work, the wage earners and the sources of income at household level has been presented in this chapter. The research hypothesis that the enhancement in generating alternative sources of employment varies in the remote villages and the villages adjoining to municipal areas has been tested using the Welch Two Sample t-test in this chapter. With regards to female workers, Chi square test has been applied in order to know whether the type of work that females does is influenced by the blocks. The chapter also deals with the monthly and annual income, expenditure, saving and indebtedness of the rural households of Jalpaiguri district.

Chapter VII presents an outlook of the infrastructural provisions and facilities of Jalpaiguri district. It focuses upon the condition of water supply, sources of drinking water, disposal of solid waste, electrified and not electrified households, the frequency of power cut in the rural households and the veterinary facilities for the livestock in rural Jalpaiguri district. The chapter further focuses upon the availability of rural regular and periodic market, and the accessibility to market in terms of distances covered by the rural households, the banking and the availability of the agricultural credit societies. The chapter discusses the numbers of primary schools, Anganwadi centres and the health care centres. The rural communication system in terms of post office and circulation of newspaper has been discussed in this chapter. The rural transport and rural connectivity in terms of road length along with the availability of the recreational provisions have been presented in this chapter. Z score has been applied for the measurement of the levels of infrastructural development. Further, following the Government norms and guidelines, the recommended standards have been identified in order to validate the research hypothesis that the infrastructural facilities are inadequate to meet the requirement of the large scale rural population concentration.

Chapter VIII discusses the impact of rural development programmes and policies upon the rural masses in the study area. It deals with the beneficiaries of the rural housing schemes, food security schemes and the NSAP schemes and the beneficiaries of the state government educational schemes. The chapter provides a detailed account of the involvement of the rural households in NREGS and in self-help groups. It highlights the impact assessment of the rural development programmes upon the rural households. The research hypothesis regarding the study that there is a significant rise in the level of family income and the per capita income from the pre-assistance period to post-assistance period has been tested

using the Paired t- test technique in order to understand the past and present conditions of the beneficiaries in the study area.

Chapter IX deals with the description of the problems of the study area and some possible mitigation measures with some suitable proposals which can be taken into consideration for the future development of the study area

Chapter X draws the conclusion for the entire study.

1.8 Conclusion

The present research work attempts to assess the level of rural development among the blocks in terms of demographic, social, economic and infrastructural facilities. Besides, the study highlights the rural development programmes implemented in the study area and its impact upon the rural people of Jalpaiguri district. The present study has been carried out very precisely and empirically through the application of different statistical and cartographic techniques and the maps have been prepared to provide a visual impact of the research work. Thus these techniques are very helpful in drawing proper conclusions so that suitable measures can be provided for the holistic development of the study area.

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