Effect of District GDP and Literacy rate on Work Participation rate in the Districts of West Bengal

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Contents:

1. _INTRODUCTION_:

"Unemployment is an integral part

Of the normal capitalist system"

-Michael Kalecki

Unemployment refers to the individual who are willing to get a job but are unable to get a job. The people in workforce who are working but do not have an appropriate job are also included in this group.

Increasing population has been a big problem in West Bengal, which is one of the main causes of unemployment. The rate of industrial growth in West Bengal is slow. Defective planning is also one of the important causes of unemployment. In many cases the work is not given to the deserving candidates but given to the persons belonging to particular community, which gives to the unemployment.

The unemployment rate is the proportionate to the unemployed person in the labour force. It affects to the purchasing power, disposable income and also reduces the output of an economy.

A look at the unemployment figures have some characteristics which are: (i) higher growth rate of population (ii) seasonal unemployment (iii) poverty (iv) slow economic progress etc.

The report on National Sample Survey Office Report provides evidence on the unemployment crisis in India, worst in the last 45 years. The 11 states- Bihar, Odisha Uttarakhand, Jharkhand, Kerala, Assam, Uttar Pradesh, Tamil Nadu, Haryana, Punjab and Telengana have employment rate which are higher than the national average on 6.1% in 2017-18. The lowest unemployment was registered in Kerala, followed by Haryana and Assam. On the other hand the worst in term of unemployment was registered in Chhattisgarh followed by Madhya Pradesh and West Bengal. Between 2011-12 and 2017-18 there was a sharp jump of unemployment in Gujrat. Though

unemployment has grow in rural and urban sector but the wise in unemployment is more in urban sector than rural sector.

There is a negative relation between the change in the rate of real GDP growth and unemployment rate over an extended period of time. This long term relationship between GDP growth and unemployment was clearly pointed out by Okun's low. In this low it is stated that GDP growth about equals to the rate of potential output growth, usually is required to maintain a stable unemployment rate. Thus in the long term the relationship between the GDP growth and unemployment rate is the rate of growth n potential output. The rate of growth of potential output is a function of rate of growth in potential productivity and the labour supply, when the economy is full employed. When unemployment rate is high the actual GDP is less than potential GDP, which is referred to as the output gap. If the GDP growth rate is below from the rate of labour force growth then the job seeker will not able to get new job as there will not enough job as a result the proportional labour force will fall and unemployment rises. Again if the rate of growth exceeds the rate of labour force growth then new job is created to accommodate all new job seeker as a result unemployment fall.

As there is an inverse relationship between the unemployment rate and work participation rate, GDP is related to both unemployment and work participation rate. The general understanding is that the work participation should be proportion to the growth in GDP. Creating more jobs opportunities increases work participation rate and decreases unemployment rate, similarly less job opportunities creates a sharp fall in work participation rate. More employment and income leads to an increase in the growth in GDP.

There is a negative relationship between unemployment rate and literacy rate. Without the foundation of education, there exists less probability of employment. For the people with low literacy level who do not get work, it's often unstable, low paying job with little possibility of career progression. Further the children of illiterate and unemployed parents often inherit the same problem. According to data from U.S. Bureau of labour Statistics (BLS), earning increase and unemployment decreases as educational attainment arises

2. *MOTIVATION :-*

West Bengal is fourth-most populous state in India. In the year 2019 the population rate in West Bengal is 9.98 crore. If we notice the district wise GDP rate in West Bengal, then we can see that the GDP growth of West Bengal in recent year is 14.7%. In India, West Bengal rank 6th in GDP and 20th in per capita income. So the GDP and per capita income of West Bengal is not so good compared to the other developed states.

So from the above discussion, we find that West Bengal has lower GDP with high population rate, and as a result unemployment rate is high in West Bengal.

The rate of economic development is very slow in West Bengal, which neglects to give enough opportunities to the growing population. This constant increase in a population has been a major issue in West Bengal. Huge increase in population is one of the fundamental causes of joblessness.

Literacy rate is also one of the important factors that affects unemployment rate as the individual with high literacy rate is only able to get a job which is much better than the job which individual having with low literacy rate.

In West Bengal we can see two faces in employment situation. One is the workers who are skilled and trained and on the other hand the low skilled workers. As a results of low skilled workers, they lose their jobs and not able to find new employment opportunities, which leads to the fall in labour force automatically. We can also see that labour force participation varies with people's demographic characteristics, like birth, sex, year of birth, education, material status and the presence of young children at home. Economic conditions and fiscal policies also affect labour force participation rate.

The unemployment rate is an important measure of the underutilization of labour supply. It reflects the inability of an economy to generate employment for the employed persons. Unemployment is also an important macroeconomic indicator for several reasons. The amount of unemployment shows that how our economy is operating. Unemployment has both individual

and social consequence which requires public policy intervention. For the individual unemployment cause physiological stress which lead to decline in life satisfaction.

Low unemployment is usually regarded as a positive sign for economy. A low rate of unemployment has negative side consequence like inflation and reduces productivity.

3. LITERATURE and REVIEW :-

Some reviews about dealing with unemployment have been published (e.g Waters, 2000,) , which conclude the need for studying the unemployment dealing process (e.g. , Kinicki et al. , 2000 ; Mckee- Ryan et al. , 2005; Rudisill et al. , 2010 ; Waters , 2000). The research literature shows a strong relation between unemployment and ill health. Some illness is caused by unemployment, while other health problems are increased by unemployment (Smith, 1987; Mathers & Schofied, 1998).

Unemployment is a major problem in West Bengal. Unemployed person gives less contribute to the economy compared to employed person, and its rate is a known health concern (Tarrant, 2013). Another factor affecting unemployment is education where the educational achievement itself serves as the predictor. The coverage of media with unemployment plays an important role in encouraging the individual to get a job. It also creates the way to overcome the negativity of companies by facilitating them with relationship and opportunities. It also provide known opportunities, as it provides support socially and emotionally, it exchange information with other employees and companies (Douglad et al. , 2008)

Unemployment rate is negatively affected by growth (Hassan and Nassar, 2005). There is a statistically significant negative effect of GDP on unemployment and the effect of net average wage on youth unemployment is positive (Balan, 2014). Sackey and Osei (2006) found that due to the lower market skill the younger are more likely to be unemployed as compared to older people. Increasing the higher wages above the equilibrium wages as incentives to increase the efficiency of employees the cause of unemployment (Shapiro and Stiglitz, 1984).

Diitov (2012) in his study realized that the week quality of literacy system and economic cycle represents the key determinant of increases unemployment rate among youth.

Greatz (1987) showed that the people of working class are less aware about the causes of unemployment. There is a relationship between inflation and unemployment, which gives either positive or negative effect, depends on the goods and labour market availability (Lui, 2009). It also found that high rate of inflation generates a negative effect on unemployment as compared to lower inflation rate.

Female labour supply has been a subject of wide spread economic enquiry for many decades (Altoni & Blank, 1999; Blau & Khan, 2013). Economics at the micro level economics, have studied the effects of mother's labour supply on outcomes like cognitive development and schooling of children (Blau & Grossberg, 1992, Brooks-Gunn, Han, & Waldfogel, 2002; Ruhum,2004), while at the macro level economics, economists studied about the relationship between the labour force participation and economic growth (Bhalotra & Umna – Aponte,2010; Kalsen and Pieters, 2012). There is also a wide literature on the relationship between female labour supply and fertility decision).

Several model have been suggest to explain the process of dealing with unemployment (DeFrank & Ivancevich , 1986; Gowan & Gateway , 1997 ; Latack et al. ,1995 ; Leana & Feldman , 1998 ; Waters , 2000). Though those models are differed from each other, a general functional structure of unemployment can be described.

Some reviews about dealing with unemployment have been published (e.g Waters, 2000,) , which conclude the need for studying the unemployment dealing process (e.g. , Kinicki et al. , 2000 ; Mckee- Ryan et al. , 2005; Rudisill et al. , 2010 ; Waters , 2000). The research literature shows a strong relation between unemployment and ill health. Some illness is caused by unemployment, while other health problems are increased by unemployment (Smith, 1987; Mathers & Schofied, 1998)

The labour force participation rate plays arole in determining the economic growth and development (Mujhid, 2004). Generally the high female participation in the labour market

implies the advancement in the economic and empowerment of woman, hence promoting equity and increased the utilization of human potential, which lead to an increase in the capacity of economic growth. A higher labour force participation in labour market increased labour supply, productivity and standard of living through poverty reduction among women and children.

Goldin (1995) in his study showed that there is a relationship between labour force and GDP. Aly and Quisi (1996) did a study to find the economic factors affect the women work participation rate. He concluded that GDP is positively related to labour force participation rate. Cheng, B. S,(1996) investigates on causality between fertility rate and female labour force participation rate. Gender inequality reduces growth and development. (Kalsen, s. , 1999). Literacy rate has also a positive impact on labour force participation rate (Azid, 2001).

4. OBJECTIVES :

The study is based on secondary data from census. Our study is based on the data of census 2011. The objective of our study is to analyze the factors which are responsible for unemployment and work force participation rate. One more objective is to find out the factors on which unemployment depends. Those factors include caste system, increase in population, slow growth of industrialization less saving and investment. Another objective is to determine how literacy rate and GDP affects unemployment rate.

By analyzing the data, collected in unemployment rate, work participation rate, literacy rate and GDP, we will show the changes in unemployment situation in unemployment rate in West Bengal. In this study we will show the interrelation between unemployment rate, district GDP, literacy rate and work participation rate in West Bengal by using multiple linear regression model.

5. METHODOLOGY :

Research on unemployment and employment in West Bengal should be done on the basis of survey, which are undertaken to collect information. From that survey data,, we have to form a

descriptive statistics and analyze the whole mater. Due to this pandemic situation, it is not possible to conduct a survey. Hence the study is based on the secondary survey.

To continue this research we used different secondary data collected from different website of census of India. In this paper we have used district wise unemployment rate, work participation rate and GDP collected from statistical handbook of West Bengal, Census of India, Bureau of Applied Economics and Statistics. We also collect the data of literacy rate from census report.

Now by descriptive statistics we will find that what will be the values of the unemployment rate and work force participation rate. We will set up different tables, figures to see how the endogenous variable of our regression equation has changed in different years. In our objective section we showed that how literacy and GDP affects on unemployment rate and workforce participation rate. To study it we will use three variable regression models by using Multiple Linear Regression Model. We will perform the t-test and F- test to check whether the overall regression is statistically significant or not.

6. RESULT AND DATA :-

The study has considered district wise unemployment rate in West Bengal during 2009-10. The following table considered rural, urban and combined unemployment rate for 19 districts in West Bengal. Here we also consider district wise work participation rate, literacy rate and GDP in the following tables.

Table no 1. District wise unemployment rate in West Bengal under usual activity status by residence during 2009-10

(Per 1000 persons)

SL.NO	District	Rural	Urban	combined
1	Darjeeling	92	43	77
2	Jalpaiguri	31	78	37
3	Cooch Behar	12	29	12
4	Uttar Dinajpur	18	51	21
5	Dakshin Dinajpur	0	35	3
6	Malda	8	31	11
7	Murshidabad	15	49	17

8	Birbhum	36	87	39
9	Barddhaman	17	54	28
10	Nadia	12	30	16
11	North 24 Parganas	22	48	34
12	Hooghly	13	6	37
13	Bankura	2	27	5
14	Purulia	4	56	9
15	Paschim Mednipore	7	36	12
16	Howrah	19	35	26
17	Kolkata		34	34
18	South 24 Parganas	8	34	11
19	Purba Mednipore	22	49	24
20	**West Bengal**	**15**	**42**	**23**

Source : District level pooled Estimates of key employment and unemployment indicators of West Bengal 2009-10

From the above table we can see that in the case of rural unemployment the mean is 14.47, median is 13, mode is 12, standard deviation is 9.74, range is 36 and skewness is 0.64. For urban unemployment mean is 42.77, mode is 35, median is 35.5, range is 81. Standard deviation is 18.91 and skewness is 0.71
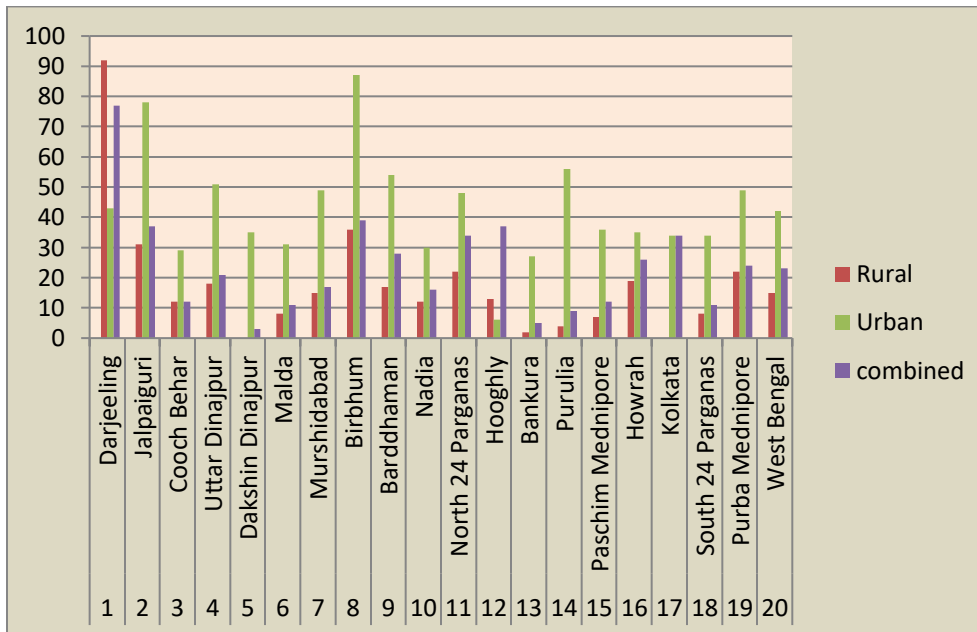
By seeing the above table and the diagram we find that unemployment rate is higher in Darjeeling and lower in Dakshin Dinajpur. If we observed the rural unemployment rate then again we can see that the unemployment rate is high in Darjeeling and low in Bankura, while the

unemployment rate is absent in Kolkata and Dakshin Dinajpur. The urban unemployment is highest in Birbhum and lowest in Hooghly. However it is seen from the above table that the unemployment rate is lower in Bankura and Purulia compared to other district of West Bengal.

**Table 2 .- Literacy rate in West Bengal by District**

(Percent)

District	litarecy rate					
	Person		Male		Female	
	2001	2011	2001	2011	2001	2011
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
West Bengal	68.64	76.26	77.02	81.69	59.61	70.54
Burdwan	70.18	76.21	78.63	82.42	60.95	69.63
Birbhum	61.48	70.68	70.89	76.92	51.55	64.14
Bankura	63.44	70.26	76.76	80.05	49.43	60.05
Purba Mednipur		87.02		92.32		81.37
Paschim Mednipur	74.9	78	84.91	85.26	64.42	70.5
Howrah	77.01	83.31	83.22	86.95	70.11	79.43
Hooghly	75.11	81.8	82.59	87.03	67.21	76.36
24- Parganas(N)	78.07	84.06	83.92	87.6	72.72	80.34
24 Parganas(S)	69.45	77.51	79.19	83.35	59.01	71.4
Kolkata	80.86	86.31	83.79	88.34	77.3	84.06
Nadia	66.14	74.97	72.31	78.75	59.58	70.98
Murshidabad	54.35	66.59	60.71	69.95	47.63	63.09
Uttar Dinajpur	47.89	59.07	58.48	65.52	36.51	52.17
Dakshin Dinajpur	63.59	72.82	72.43	78.37	54.28	67.01
Malda	50.28	61.73	58.8	66.24	41.25	56.96
Jalpaiguri	62.85	73.25	72.83	79.95	52.21	66.23
Darjeeling	71.79	79.56	80.05	85.61	62.94	73.33
Cooch Behar	66.3	74.78	75.93	80.71	56.12	68.49
Purulia	55.57	64.48	73.72	77.86	36.5	50.52

Source : Director of Census Operation, West Bengal

In the above table it is seen that in the year 2001 the mean of the male literacy rate is 74.73, median is 75.93, standard deviation is 8.66, range is 26.43 and skewness is -0.79; while the mean of female literacy rate is 56.39, median is 56.12, standard deviation is 12.05, range is 40.8 and skewness is -0.09. In 2011 the mean of the male literacy rate is 80.59, median is 80.38, standard

deviation is 7.51, range is 26.8 and skewness is -0.70 while the mean of the female literacy rate is 68.69 median is 69.49, standard deviation is 9.76, range is 33.54 and skewness is -0.28
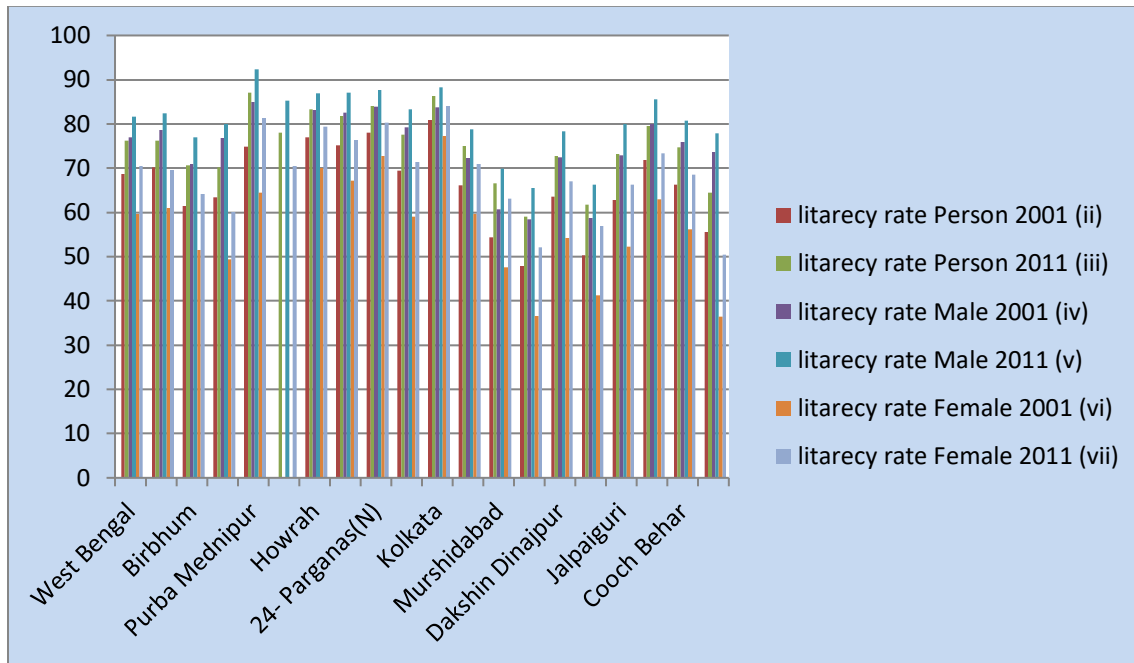
We can conclude from the mean median is that in 2011 the male and female literacy rate is higher than in the year of 2001

Considering the above table we can say that in 2001 male literacy rate is higher in Purba Mednipur and lower in Uttar Dinajpur while female literacy rate is higher in North 24 Porgona and lower in Purulia. The total literacy rate is higher in Kolkata.

 In the year of 2011 the male literacy rate is highest in Purba Mednipur and lowest in Uttar Dinajpur, while female literacy rate in West Bengal is highest in Kolkata and lowest in Purulia. Total literacy rate is highest in Purba Mednipur and lowest in Uttar Dinajpur.

 Now we will create a table to determine the rural female work force participation rate for the district of West Bengal.
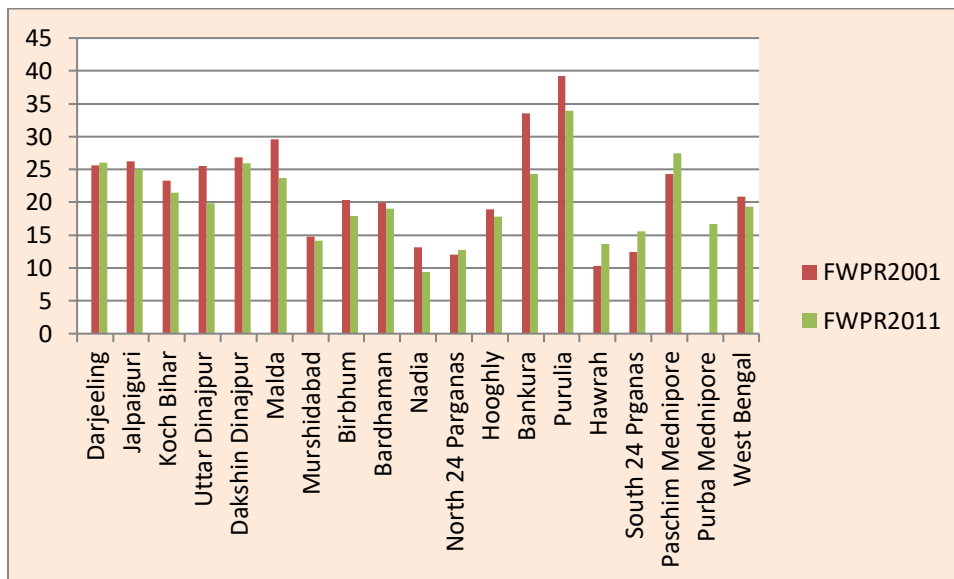
Table 3 . Rural female work participation rate for the districts of the West Bengal in 2001-2011

District	FWPR2001	FWPR2011
Darjeeling	25.65	26.01

Jalpaiguri	26.2	25.05
Koch Bihar	23.28	21.43
Uttar Dinajpur	25.54	19.84
Dakshin Dinajpur	26.85	25.96
Malda	29.6	23.68
Murshidabad	14.74	14.19
Birbhum	20.35	17.93
Bardhaman	19.98	19.05
Nadia	13.17	9.37
North 24 Parganas	11.98	12.75
Hooghly	18.91	17.78
Bankura	33.53	24.29
Purulia	39.2	33.99
Hawrah	10.29	13.65
South 24 Prganas	12.39	15.53
Paschim Mednipore	24.26	27.47
Purba Mednipore		16.74
West Bengal	20.86	19.35

Source : Census of India (2001,2011)

From the above table we can conclude that in 2001 the mean of female work participation rate is 21.89, median is 21.85, standard deviation is 8.26, range is 28.91 and skweness is 0.40; while in 2011 the mean of female work participation rate is 19.92, median is 19.05, standard deviation is 6.25, range is 25.62 and skewness is 0.45

From the mean in the above we can conclude that in 2001 female work participation rate is higher than in the year of 2011

If we consider the above table and diagram, we see that, in the year 2001 , Female Work Participation Rate is highest in Malda and lowest in Howrah. If we observe the female work participation rate in 2011 we can find that the Female work participation rate is higher in Howrah and lower in Nadia compared to other districts of West Bengal. However we conclude that Female Work Participation Rate is high in West Bengal in 2001 compared to the year of 2011.

Table no 4 . Numbers of literates in West Bengal , Census, 2011 (Provisional)

(Numbers)

District	Literate Population				
	Males	Females	Total	Rural	Urban
(i)	(ii)	(iii)	(iv)	(v)	(vi)
West Bengal	34508159	28106397	62614556	39898187	22716369
Burdwan	2979074	2371123	5350197	3048014	2302183
Birbhum	1214772	961151	2175923	1846090	329833
Bankura	1321794	942219	2264013	2028958	235055
Purba Mednipur	2178611	1791139	3969750	3494836	474914
Paschim Mednipur	2333679	1839843	4173522	3606955	566567
Howrah	1972282	1670335	3642617	1277113	2365504
Hooghly	2250780	1889707	4140487	2421002	1719485
North 24 Parganas	4174559	3624163	7798722	2973608	4825114
South 24 Parganas	3120200	2518912	5639112	4065797	1573315
Kolkata	1966122	1682088	3648210		3648210
Nadia	1906966	1617107	3524073	2386943	1137131
Murshidabad	2223237	1911347	4134584	3254627	879957
Uttar Dinajpur	872285	649648	1521933	1262730	259203
Dashin Dinajpur	607992	494363	1102355	906370	195985
Malda	1182672	954226	2136898	1771627	365271
Jalpaiguri	1412065	1114953	2527018	1752822	774196
Darjeeling	723711	604507	1328218	752287	575931
Cooch Behar	1045903	834081	1879984	1643723	236261
Purulia	1021455	635485	39898187	1404686	252254

Source : Census Report
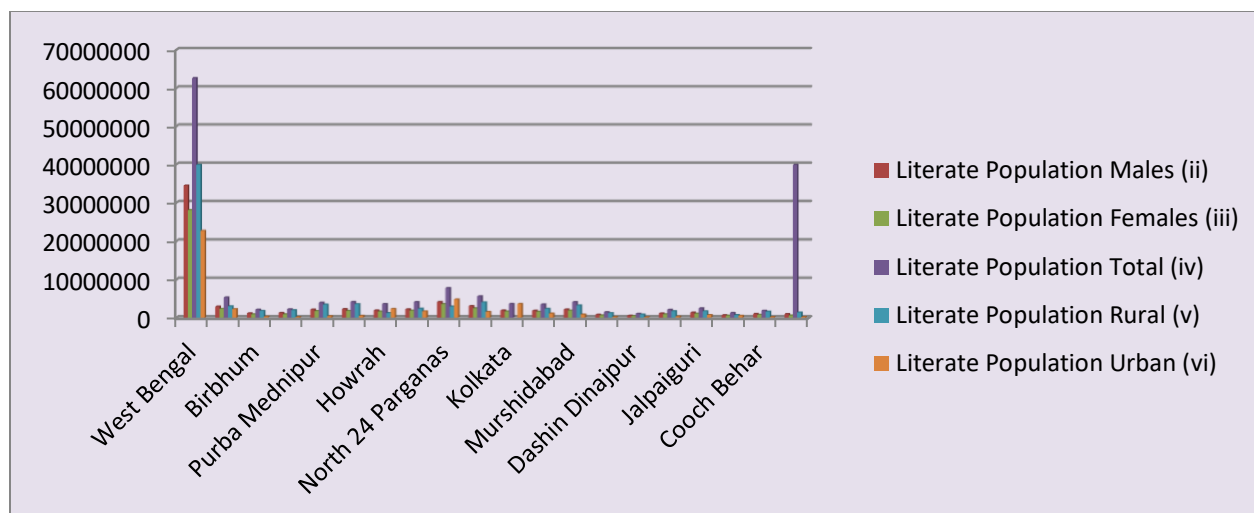
From the table and the bar diagram we see that the male literate population is higher in North 24 porgonas and lower in Dakshin Dinajpur, while female literates population is higher in North 24 porgona and lower in Darjeeling. Total literates (male + female) population is higher in South 24 porgona and lower in Darjeeling. Urban literate population is high in North 24 porgona and lower in Bankura

Table no 5. District wise unemployment rate in West Bengal under usual activity status by sex during 2009-10

(Per 1000 persons)

Sl No.	District	Male	Female	Persons
1	Darjeeling	63	112	77
2	Jalpaiguri	25	93	37
3	Cooch Behar	16	0	12
4	Uttar Dinajpur	25	6	21
5	Dakshin Dinajpur	2	9	3
6	Malda	11	8	11
7	Murshidabad	20	6	17
8	Birbhum	43	8	39
9	Barddhaman	28	25	28
10	Nadia	14	22	16
11	North 24 Parganas	33	36	34
12	Hooghly	33	51	37
13	Bankura	5	0	5
14	Purulia	10	3	9

15	Paschim Mednipore	13	5	12
16	Howrah	26	26	26
17	Kolkata	27	74	34
18	South 24 Parganas	12	10	11
19	Purba Mednipore	10	90	24
20	**West Bengal**	**21**	**25**	**23**

Source : District level pooled estimates of key employment and unemployment indicators of West Bengal 2009-10

From the above table we say that the mean of the male unemployment rate is 19.11, median is 18, mode is 25, standard deviation is 11, range is 41 and skewness is 0.35; while the mean of the female unemployment rate is 26.22, median is 9.5, standard deviation is 30.62, range is 93 and skewness is 1.35
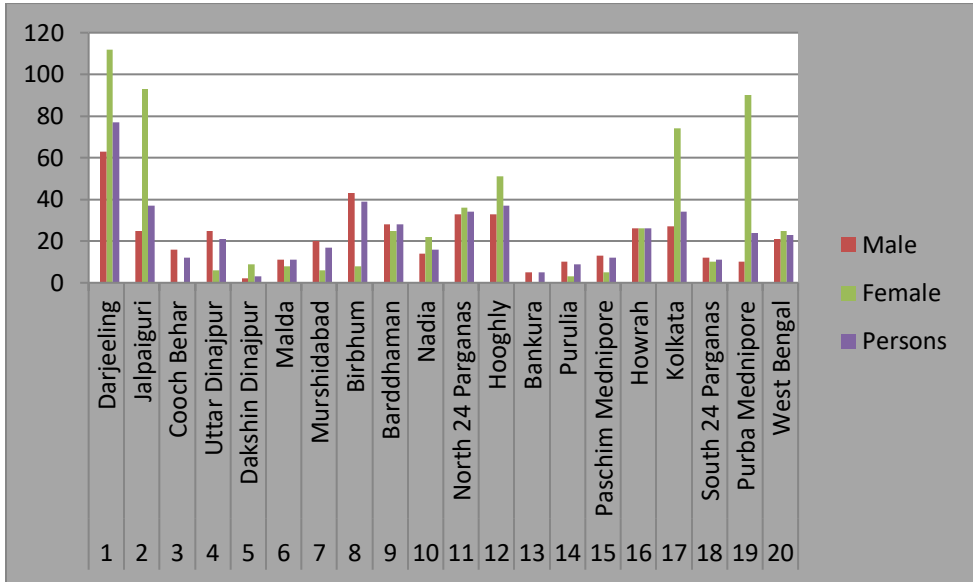
Considering the above table and diagram we see that unemployment rate in male is highest in Darjeeling and lowest in Dakshin Dinajpur. Female unemployment rate is highest in Darjeeling and lowest in Purulia while this rate is absent in Cooch Behar. In total the unemployment rate is highest in Darjeeling and lowest in Daksin Dinajpur, Bankura and Purulia compared to other district of West Bengal.

Table no 6. Literacy rate in the district of West Bengal   (Percent)

District	2001					2011				
	Rural	Urban	Total	Male	Female	Rural	Urban	Total	Male	Female
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)
West Bengal	63.42	81.25	68.64	77.2	75.61	72.97	85.54	77.28	82.67	71.16
Burdwan	65.83	77.39	70.18	78.63	60.95	73.39	82.75	77.15	83.44	70.47
Birbhum	59.88	77.65	61.48	70.89	51.55	69.25	81.74	70.9	77.42	64.07
Bankura	62.04	80.22	63.44	76.76	49.43	69.6	85.23	70.95	81	60.44
Paschim Mednipur	68.71	82.43	70.41	81.28	59.11	77.92	87.01	79.04	86.66	71.11
Purba Mednipur	79.83	83.79	80.16	89.13	70.7	87.47	89.14	87.66	93.14	81.81
Howrah	72.81	81.02	77.01	83.22	70.11	80.82	85.58	83.85	87.69	79.73
Hooghly	71.02	82.95	75.11	82.59	67.21	97.22	87.75	82.55	87.93	67.95
North 24 Parganas	69.07	85.19	78.07	83.92	71.72	78.11	89.8	84.95	88.66	81.05
South 24 Parganas	67.4	79.84	69.45	97.19	59.01	76.78	83.62	78.57	84.72	72.09
Kolkata	-	80.86	80.86	83.79	77.3	-	87.14	87.14	98.08	84.98
Nadia	61.82	81.41	66.14	72.31	59.58	71.5	85.88	75.58	79.58	71.35
Murshidabad	52.28	86.34	54.35	60.71	47.63	66.27	72.65	67.53	71.42	63.88
Uttar Dinajpur	42.86	80.5	47.89	78.48	36.51	57.15	80.67	60.13	66.65	53.15
Dakshin Dinajpur	60.38	83.28	63.59	72.43	54.28	71.18	89.42	73.86	79.63	67.81
Malda	47.76	97.28	50.28	58.8	41.25	60.42	76.82	62.71	67.27	57.84
Jalpaiguri	58.93	80.02	62.85	72.83	52.21	70.55	82.33	73.79	80.61	66.65
Darjeeling	66	83.34	71.79	80.05	62.94	74.97	87.48	79.92	85.94	83.74
Cooch Behar	64.27	85.18	66.3	75.93	56.12	73.87	89.1	75.49	81.52	69.08
Purulia	53.24	75.4	55.57	73.72	36.5	63.75	76.24	65.38	78.85	51.29

Source : Census Report
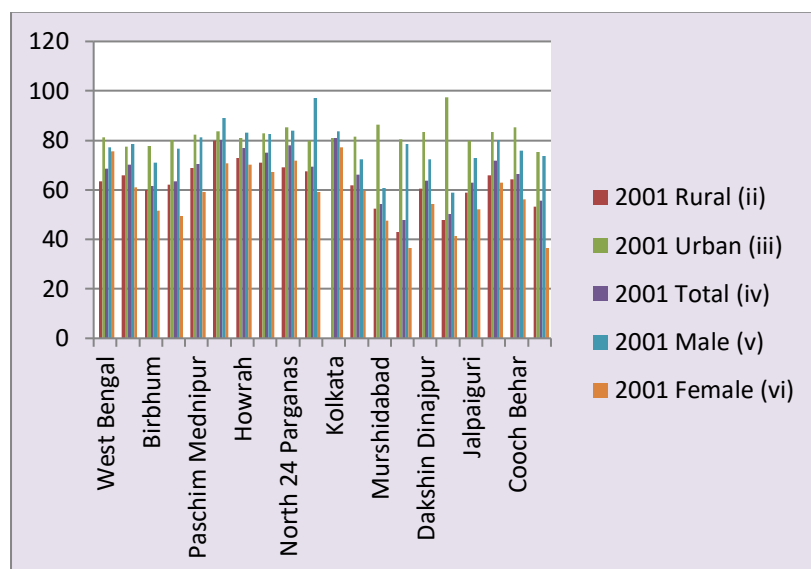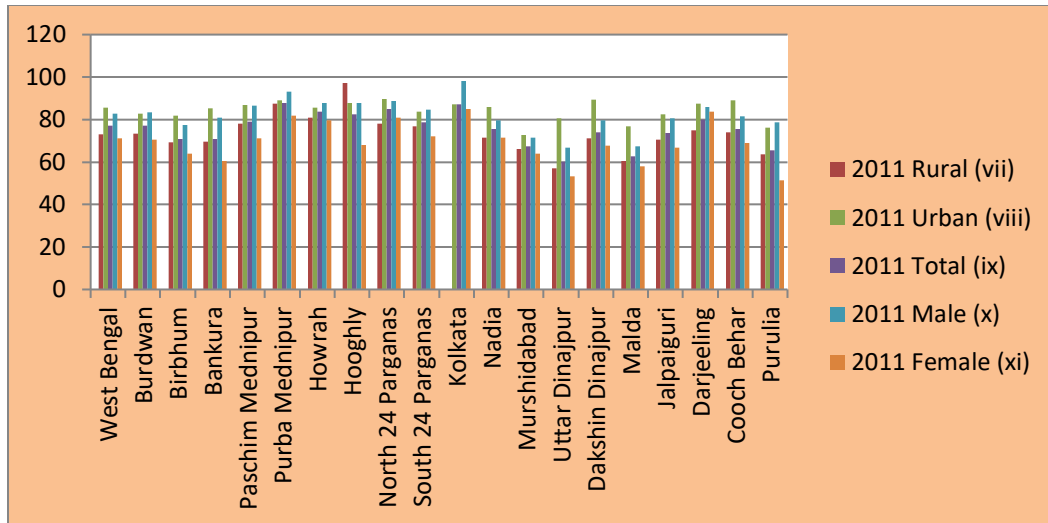
In 2001 the mean of rural literacy rate is 58.79, median is 61.93, standard deviation is 17.28, range is 79.83 and skewness; while in 2011 the mean of rural literacy rate is 69.26, median is 71.34, standard deviation is 19.67, range is 97.22 and skewness is -2.63. In 2001 the mean of urban literacy rate is 82.59, median is 81.92, standard deviation is 4.55, range is 21.88 and skewness is 1.88, while in 2011 the mean of literacy rate is 84.31, median is 85.73, standard deviation is 5, range is 17.15 and skewness is -1.03

From the mean we can conclude that the rural literacy rate is higher in the year of 2011 than ion 2001 and urban literacy rate is higher in the year of 2011 than in the year if 2001.

From the table and diagram we see that in 2011, the literacy rate in West Bengal is higher than in the year of 2001. In 2001 the rural literacy rate is higher in Purba Mednipur and lower in Uttar Dinajpur. In 2011 the rural literacy rate is higher in Hooghly and lower in Malda. Urban literacy rate in 2001 is higher in Malda and lower in Purulia. In 2011 the urban literacy rate is higher in North 24 porgona and lower in Murshidabad. The total literacy rate in 2001 is higher in Kolkata and lower in Malda and in 2011 the total literacy rate is higher in Purba Mednipur and lower in Malda. In 2001 male literacy rate is higher in South 24 porgona and lower in Murshidabad and female literacy rate is higher in Kolkata and lower in Purulia . In 2011 male literacy rate is higher in Kolkata and lower in Uttar Dinajpur while female literacy rate is higher in Darjeeling and lower in Purulia

Table no 7 . Annual Growth Rates of Gross District Domestic Product of West Bengal at constant (2004-05) prices

(Percent)

District	Percentage change over previous year								Average Growth
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(P)	2012-13(Q)	
Burdwan	2.63	11.05	4.9	2.74	7.28	4.28	3.91	5.18	6.5
Birbhum	8.64	9.44	6.12	3.48	4.16	1.31	9.38	4.39	5.87
Bankura	9.48	5.83	7.84	2.68	12.69	-1.91	10.68	6.68	6.75
Midnapore East	-0.34	8.5	5.97	6.63	2.78	14.87	0.41	6.58	5.68
Midnapore West	5.66	7.42	9.25	1.01	11.54	2.72	2.35	10.89	6.36
Howrah	5.79	10.63	7.23	4.67	12.66	13.07	2.34	7.09	7.94
Hooghly	7.79	1.99	10.96	5.32	12.66	5.34	2.24	6.66	6.62
24 -Parganas(N)	11.23	6.96	10.61	8.14	5.64	6.22	6.02	8.15	7.87
24 Parganas(S)	3.31	12.5	7.15	2.98	3.65	9.01	5	5.43	6.13
kolkata	10.57	8.41	7.67	6.68	0.09	4.46	7.46	7.35	6.59
Nadia	6.62	5.07	8.36	5.27	7.37	2.54	4.37	6.85	5.81
Murshidabad	8.47	6.53	8.2	1.66	7.28	3.92	3.88	5.82	5.72
Uttar Dinajpur	10.06	3.29	8.66	6.08	5.42	6.97	4.87	5.71	6.38
Dakshin Dinajpur	5.26	2.89	7.34	3.5	9.88	6.12	4.17	4.94	5.51
Malda	3.39	6.37	7.45	4.38	6.86	6.9	5.71	5.77	5.48
Jalpaiguri	2.85	10.45	6.5	5.52	8.54	5.49	4.09	6.39	6.23
Darjeeling	9.04	7.41	6.19	12.88	16	6.08	6.99	8.78	9.17
Cooch Behar	5.74	1.53	8.87	3.78	8.67	2.09	3.8	6.57	5.01
Purulia	4.51	9.05	5.87	4.72	9.89	-0.39	11.22	4.64	6.19
West Bengal	**6.29**	**77.79**	**7.76**	**4.9**	**8.03**	**5.78**	**4.72**	**6.72**	**6.5**

Source : Bureau of Applied Economics and statistics

In 2010-11 the mean of GDP is 5.26, median is 5.415, standard deviation is 4.20, range is 16.78 and skewness is 0.65. Again in the year of 2011-12 the mean of the annual GDP is 5.27, median is 4.62, standard deviation is 2.94, range is 10.81 and skewness is 0.64 and lastly in the year of 2012-13 the mean of annual GDP is 6.59, median is 6.57, standard deviation is 1.56, range is 6.5 and skewness is 1.18

 We conclude from the above discussion that in the year of 2009-10 the annual growth rate of GDP is higher and lower in the year of 2008-09 compared to the other years

Now we will consider the above table and diagram. We can find that in the year 2005-06 GDP is higher in North 24 Porgona and lower in East Midnapur. Similarly in the year of 2006-07 the GDP is higher in South 24 Porgona and lower in Cooch Behar. In the year of 2007-08 the GDP is higher in Hooghly and lower in Burdwan. The GDP is higher in Darjeeling and lower in West Midnapur in the year of 2008-09. In the year of 2009-10 the GDP is higher in Darjeeling and lower in Kolkata. In 2011-12 the GDP is higher in Howrah and lower in Bankura. GDP is higher in Purulia and lower in East Midnapur in the year of 2011-12. In the year of 2012-13 the GDP is higher in West Midnapur and lower in Birbhum. At last we conclude that in West Bengal the GDP is higher I the year of 2006-07 compared to other year.

Now we will create a table to estimates Gross District Domestic Product in West Bengal at constant prices.

Table no. 8. Estimates Gross District Domestic Product of West Bengal at constant (2004-05) prices

District	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)	2012-13(Q)
Burdwan	22357.47	22946.58	25482.48	26731.47	27463.67	32208.56	33588.59	34901.71	36711.07
Birbhum	5924.68	6436.33	7044.16	7475.61	7735.64	8057.16	8162.88	8928.32	9320.62
Bankura	6625.78	7253.88	7677.04	8279.19	8501.46	9680.03	9397.08	10400.71	11095.06
Midnapur East	16728.73	16672.62	18089.79	19169.64	20441.05	21010.13	24134.15	24232.67	25827.83
Midnapur West	10889.9	11506.06	12359.28	13502.63	13638.37	15211.87	15625.54	15992.2	17734.39
Howrah	11614.02	12286.07	13591.92	14575.03	15255.97	17187.44	19433.37	19887.63	21297.31
Hooghly	13613	14673.07	14965.27	16604.91	17488.49	1902	20753.25	21217.78	22631.44
24-Porgonas(N)	24416.69	27157.76	29049.04	32131.75	34747.1	36706.81	38989.62	41335.55	44705.65
24-Porgonas(S)	16884.94	17443.65	19623.98	21026.4	21652.35	22442.53	24465.14	25688.17	27083.75
kolkata	19725.04	21809.83	32642.98	25456.57	27157.46	27182.6	28394.04	30512.2	32754.75
Nadia	10628.3	11332.29	11907.09	12902.15	13582.01	14582..82	14952.63	15605.4	16674.99
Murshidabad	12332.96	13377.28	14250.25	15418.77	15673.97	16814.82	17474.78	18152.17	19208.84
Uttar Dinajpur	3895.05	4286.99	4427.94	4811.32	5103.05	5380.47	5755.56	6035.96	6380.84
Dakshin Dinajpur	3048.61	3208.83	3301.6	3543.92	3667.88	4030.1	4276.87	4455.07	4675.19
Malda	7162.25	7405.23	7876.82	8463.37	8834.46	9440.85	9809.23	10369.44	10967.86
Jalpaiguri	7948.42	8174.99	9029.66	9616.55	10147.32	11013.99	11618.13	12093.17	12865.41
Darjeeling	4960.25	5408.76	5809.29	6168.89	6963.2	8077.38	8568.12	9166.81	9971.82
Cooch Behar	5066.53	5357.48	5439.69	5921.95	6086.57	6614.49	6752.86	7009.46	7469.76

Purulia	4833.75	5051.76	5508.84	5832.06	6107.54	6711.28	6685.21	7435.08	7779.72
West bengal	**208656.4**	**221789.5**	**239077.1**	**257632.2**	**270248.3**	**291955**	**308837.1**	**323419.5**	**345156.3**

Source : Bureau of Applied Economics and Statistics
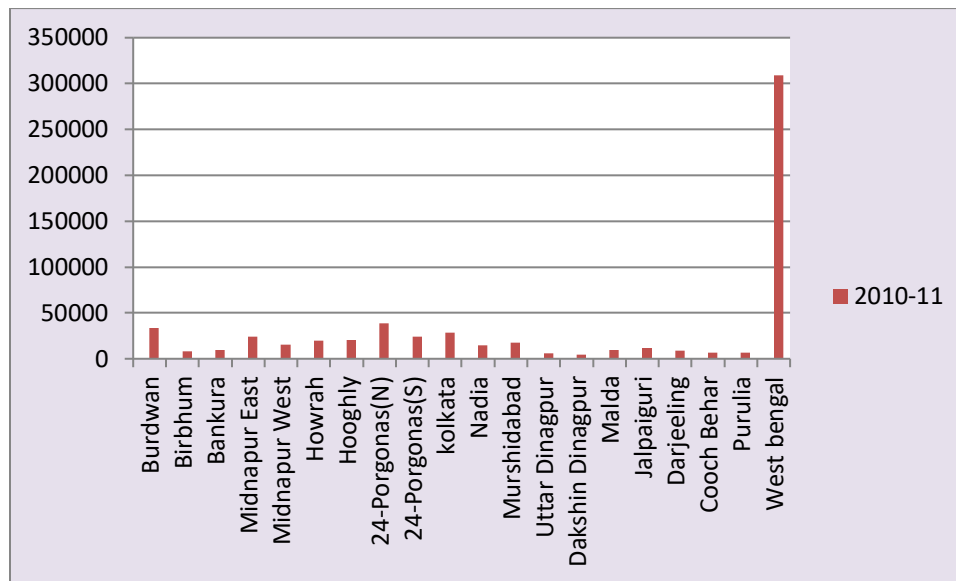
By seeing the above table we can see that the Estimates Gross District Domestic Product is higher in North 24 Porgona and lower in Dakshin Dinajpur in the year of 2004-05, 2005-06, 2007-08, 2008-09, 2009-10, 2010-11, 2011-12, 2012-13. And in the year of 2006-07 the GDP is higher in Kolkata and lower in Dakshin Dinajpur.

Table no. 9 : Female work participation rate in Various Districts of West Bengal by Sex and Region- 2001

Sl No.	District	Rural & Urban		Rural		Urban	
		Male	Female	Male	Female	Male	Female
1	Darjeeling	48.51	28.31	47.92	25.65	49.72	12.16
2	Jalpaiguri	52.27	23.5	52.24	26.2	52.43	11
3	Koch Bihar	54.91	22.22	55.14	23.28	52.67	11.65
4	Dakshin Dinajpur	55.62	25.11	56.65	26.85	48.78	13.84
5	Malda	52.55	28.29	52.69	29.6	50.81	11.59
6	Murshidabad	51.14	16.37	51.27	14.74	50.23	27.67
7	Birbhum	54.3	19.65	54.54	20.35	51.83	12.2
8	Bardhaman	53.33	16.03	56.51	19.98	48.59	9.09
9	Nadia	54.96	14.07	55.06	13.17	54.57	17.37
10	North 24 porgona	53.93	11.33	54.07	11.98	53.81	10.78
11	Hooghly	56.5	16.16	57.75	18.91	54.13	10.46

12	Bankura	56.75	32.04	75.05	33.53	53.04	12.42
13	Purulia	52.31	36.21	52.94	39.2	46.79	90
14	Midapur	54.5	22.82	54.96	24.26	50.58	10.08
15	Howrah	55.85	9.19	55.52	10.29	56.16	8.05
16	Kolkata	58.06	12.84	-	-	58.06	12.84
17	South 24 porgona	51.82	11.83	51.58	12.39	53.08	8.77
18	Uttar Dinajpur	51.89	23.84	52.12	25.54	50.23	11.11

Source : Census of India, 2001, West Bengal
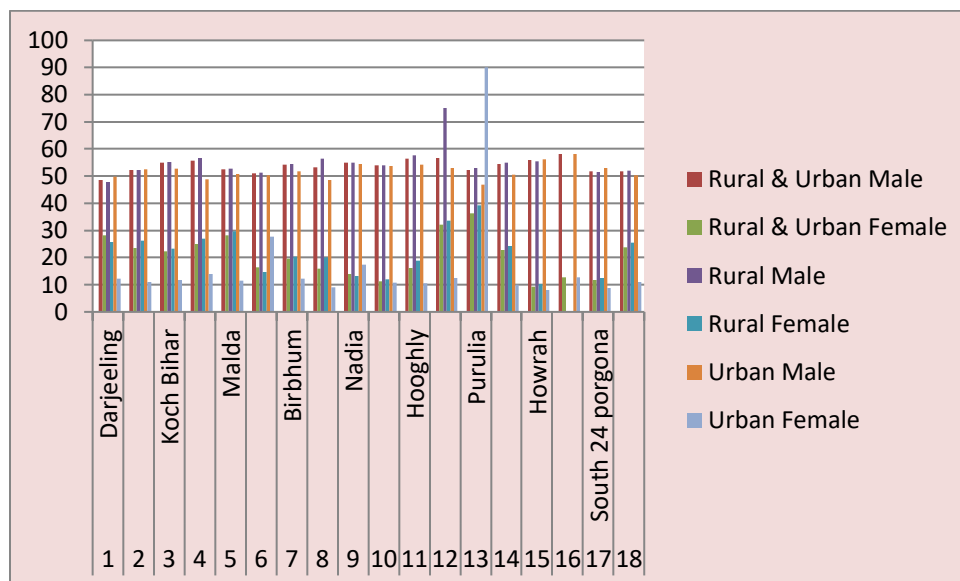
In the above table it is seen that in rural area male work participation rate is higher in Hooghly and lower in Darjeeling, while female participation rate is higher in Purulia and lower in Howrah and absent in Kolkata. In urban area male work participation rate is higher in Hooghly and lower in Purulia, while female participation rate in urban area is higher in Murshidabad and lower in Howrah. In both rural and urban area male work participation rate is high in Bankura and lower in Darjeeling

Regression Analysis

Table no 10

(Percent)

Sl no	District	Work Participation rate	District GDP	Literacy rate
1	Darjeeling	26.01	6.08	79.92

2	Jalpaigui	25.05	5.49	73.79
3	Koch behar	21.43	2.09	75.49
4	Uttar Dinajpur	19.84	6.97	60.13
5	Dakshin Dinajpur	25.96	6.12	73.86
6	Malda	23.68	6.9	62.71
7	Murshidabad	14.19	3.92	67.53
8	Birbhum	17.93	1.31	70.9
9	Barddhaman	19.05	4.28	77.15
10	Nadia	9.37	2.54	75.58
11	North 24 porgona	12.75	6.32	84.95
12	Hooghly	17.78	5.34	82.55
13	Bankura	24.29	-1.91	70.95
14	Purulia	33.99	-0.39	65.38
15	Hawrah	13.65	13.07	83.85
16	South 24 porgona	15.53	9.01	78.57
17	Paschim mednipur	27.47	2.72	79.04
18	Purba mednipur	16.74	14.87	87.66

In determining the interrelation, the study fits a multiple linear regression model where the work participation rate is dependent variable and District GDP and literacy rate is regressed upon the percentage of work participation rate, which are the explanatory variables. The model specified as follows.

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + €_I \text{----------(1)}$$

Where, i = 1,2.3,……..,18

Y_i = Work participation- rate; X_{1i} =Literacy rate; X_{2i} = District GDP; α and β_1, β_2 are unknown parameters; and $€_I$ is the disturbance term.

Estimating the equation (1) by OLS method, we get

$$\hat{Y}_I = \hat{\alpha} + \hat{\beta}_1 X_{1i} + \hat{\beta}_2 X_{2i} \text{-----------(2)}$$

$\hat{\alpha}$ and $\hat{\beta}_1$, $\hat{\beta}_2$ are the numerical estimates of α and $\beta1$, $\beta2$

Estimated values are:

$\bar{Y} = 18.59$

$\bar{X}1 = 5.25$

$\bar{X}2 = 75$

$\sum X1 = 94.63$

$\sum X2 = 1350.01$

$\sum X_1^2 = 798.41$

$\sum X_2^2 = 102261$

$\sum X_1 Y = 1741.95$

$\sum X_2 Y = 27547.44$

$\sum X_1 X_2 = 7362.83$

$x_{1i}^2 = 300.91$

$x_{2i}^2 = 1009.49$

$x_{1i} y_i = -17.22$

$x_{2i} y_i = 2450.75$

$x_{1i} x_{2i} = 265.51$

Estimated values of slope parameters are :

$\hat{\alpha} = -204.89$ and $\hat{\beta}_1 = -2.86$; $\hat{\beta}_2 = 3.18$

Hypothesis testing:

For testing the significance of $\hat{\beta}_1$ we have to test the validity of null hypothesis (*H_N*) that the value of true population parameter $\hat{\beta}_1$, is zero against the alternative hypothesis (*H_A*) is not equal to zero. We set our hypothesis as :

H_N : $\hat{\beta}_1 = 0$

H_A : $\hat{\beta}_1 \neq 0$

Now, we have to compute t-value, which is denoted b y t*. The formula used for computation of t* is:

t* = $\hat{\beta}_1$/SE ($\hat{\beta}_1$) (Under H_A : $\hat{\beta}_1$ =0)

Where SE($\hat{\beta}_1$) is the standard error of $\hat{\beta}_1$

Estimated value of SE($\hat{\beta}_1$) = 0.39

Estimated value of t* is -7.33 . Now we have to compute the value of t* with the critical value of t – value from the t- table of significance of λ and degrees of freedom (n-k-1). Here n is the number of observation i.e, 18

At 5% level of significance $t_{\lambda/2}$ (n-k-1) is -7.33

We can see that |t| < $t_{\lambda/2}$, (n-k-1), absolute value of computed t is lesser than the value of critical t at 5% level of significance λ/2 and degrees of freedom (n-k-1) that is,15. So null hypothesis H_N is accepted and β_1 is statically insignificant.

 Again, for testing the significance of $\hat{\beta}_2$ we have to test the validity of null hypothesis (H_N) that the value of true population parameter $\hat{\beta}_2$, is zero against the alternative hypothesis (H_A) is not equal to zero. We set our hypothesis as :

H_N : $\hat{\beta}_2$ =0

H_A : $\hat{\beta}_2 \neq 0$

Now, we have to compute t-value, which is denoted b y t* . The formula used for computation of t* is:

t* = $\hat{\beta}_2$/SE ($\hat{\beta}_2$) (Under H_A : $\hat{\beta}_2$ =0)

Where SE($\hat{\beta}_2$) is the standard error of $\hat{\beta}_2$

Estimated value of SE($\hat{\beta}_2$) = 0.21

Estimated value of t* is 15.14. Now we have to compute the value of t* with the critical value of t– value from the t- table of significance of λ and degrees of freedom (n-k-1). Here n is the number of observation i.e, 18

At 5% level of significance t_λ (n-k-1) is 15.14

We can see that $|t| > t_{\lambda/2}$, (n-k-1), absolute value of computed t is greater than the value of critical t at 5% level of significance $\lambda/2$ and degrees of freedom(n-k-1), that is 15 .So null hypothesis H_N is rejected and we can conclude that β_2 is statistically significant.

For testing the overall significance of the model we perform the F-test. So we set our hypothesis as

$H_N : \hat{\beta}_1 = \hat{\beta}_2 = 0;$

$H_A :$ not all β's are simultaneously 0;

So, F* = (ESS/k)(RSS/(n-k-1)

Estimated value of F* is 1.52. Now we have to compare the value of F* with the critical F-value from the table for significance of λ and degrees of freedom [k,(n-k-1)]. So the critical value of F at 5% level of significance with degrees of freedom (2,16) is 0.24

So as we see that $F^* > F_{0.05}(2,16)$ at 5% level of significance, so H_N is rejected. We can conclude that there is an overall significance in the estimated multiple regression model.

The estimated value of r^2 is 0.19 ,from the value of r^2 it is clearly see that 19% of dependent variable is explained by explanatory variable.

Hence we can conclude that as district GDP increases unemployment rate increases, which is a counterintuitive results and it is seen that as district GDP increases work participation rate decreases. It is also found that with the increase in literacy rate both unemployment rate and work participation rate also increases.

7. Policy suggestion:-

The policy suggestion that are to be made, are as follows-

We have seen above that with the increase in literacy rate the work participation rate also increases. In West Bengal people are getting educated to get job. It is because of the reason that the supply of literates is much more than the demand for literates. i.e, it is a supply side effect. To earn a basic living minimum level of education is required. So the Government should take initiative to increase the literacy rate and also improve the level of education, as a result of that work participation rate also increases by okun's low

In the near future it is high time that vital efforts are made to achieve higher growth in unemployment. In our study it is clear that, such a goal would not realize through agriculture and manufacturing sector. For both the sector, the employment elasticity falls into a very low value signifying their declining potentiality to generate additional employment in the future. Some structural changes be appointed within these sectors keeping in view the objective of generating more employment opportunities.

Since the bulk future unemployed is very likely to be form rural areas, it would be necessary to put additional effort towards more employment generation in rural areas. From the perspective of additional employment generation rural areas, fully explored. The recent thrust of the government to support agro-processing sector as well as agro-allied activities is a welcome step in this direction in welcome step in this direction. In rural areas the potentiality of sectors like trade, transport etc needs to be appreciated while designing promotional policies for different sectors. In West Bengal since a good proportion of rural workers depends on them for their livelihood, steps should be taken to rejuvenate them with appropriate public support programme. The growth of rural non-farm sector is also recommended from the angle of reducing gender discrimination relating to rural employment.

8.Conclusion:-

The present analysis shows the changes in unemployment rate, work participation rate, literacy rate from 2001-1011 and district GDP from 2004-2013. Factors on which unemployment rate

depends are caste system, population growth, slow growth in industrialization, less savings and investment.

In the year 2009-10 the rural unemployment rate is highest in Darjeeling and lowest in Dakshin Dinajpur, while the urban unemployment rate is highest in Jalpaiguri and lowest in Hooghly and total unemployment rate is highest in Darjeeling and lowest in Dakshin Dinajpur compared to other district in West Bengal under usual activity status by residence during 2009-10. We can conclude that the literacy rate in person is higher in 2011 than in the year of 2001, while male literacy rate is higher in 2011 than 2001 and female literacy rate is higher in 2011 than 2001. So the overall literacy rate is higher in 2011 than 2001 Female work participation rate is higher in 2001 compared to the year of 2011. Female work participation rate is highest in Darjeeling and lowest in Howrah in 2001, while in 2011 work participation rate is highest in Purulia and lowest in Nadia. The annual Growth rate of Gross Domestic Product is higher in 2006-07 compared to the other year. It is found that in 2006-07 the GDP rate highest in Burdwan and lowest in Cooch Behar. In the year of 2010-11 the GDP rate is highest in Howrah and lowest in Bankura. In the year of 2009-10 the male unemployment rate is highest in Darjeeling and lowest in Dakshin Dinajpur, while female unemployment rate is highest in Darjeling and lowest in CoochBehar and Bankura compared to other districts and total unemployment rate is highest in Darjeeling and lowest in Dakshin Dinajpur. In rural areas the male work participation rate is highest in Hooghly and lowest in Darjeeling, while female work participation rate is highest in Purulia and lowest in Howrah, In urban area the male work participation rate is highest in Hooghly and lowest in Purulia, while female work participation rate is highest in Murshidabad and lowest in Howrah. However in total male work participation rate is highest in Bankura and lowest in Darjeeling while female work participation rate is highest in Purulia and lowest in Howrah.

From the regression analysis we can conclude that as district GDP increases unemployment rate increases, which is a counterintuitive results and it is seen that as district GDP increases work participation rate decreases. It is also found that with the increase in literacy rate both unemployment rate and work participation rate also increases.

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