Effect of Literacy Rate and Sex Ratio on Unemployment Rate in Districts of West Bengal

Prepared by

BORNALI MONDAL

A Student of Economics Honours of,

Maharajadhiraj Uday Chand Women's College, Burdwan

To

THE UNIVERSITY OF BURDWAN

(For BSc Semester VI Honours Examination)

College Roll no. - 336 University Roll no. – 180311600034

Registration Number- 201801010553, Session- 2018-19

Course Name- Field Survey and Project Report

Course code- CC14

Under the supervision of

DR. HIRANYA LAHIRI

Assistant Professor,

Department of Economics,

Maharajadhiraj Uday Chand Women's College, Burdwan

Contents:

1. Introduction

"When more and more people are thrown out of work,
unemployment results"

-Calvin Coolidge

The evidence from the state level shows that about eleven states have their employment rates higher than their national average level in 2017-18. These eleven states include Bihar, Odisha, Uttarakhand, Jharkhand, Kerala, Assam, Haryana, Uttar Pradesh, Tamil Nadu, Punjab and Telangana. The unemployment was worst in Kerala followed by Haryana and Assam. On the other hand unemployment was lowest in Chhattisgarh followed by Madhya Pradesh and West Bengal. Between 2011-12 and 2017-18 there was a sharp jump in unemployment in Gujarat. Even though unemployment has grown in both urban sectors and rural sectors, the rise in unemployment in case of urban sectors is more as compared to the case in rural sectors.

So, it is seen that unemployment has resulted in the scarcity of jobs even among educated youths and also there is no visible pattern in the rise in unemployment in the states. Unemployment is structural and technological and its growth is consistent with the overall growth in Gross Domestic Product (GDP). The creation of new jobs which requires high and specific skills has become less than the loss

of jobs which requires low skills. So, there also has been a rise in the educated unemployment. So, if this continues unemployment will one day become the most important economic problem in India.

In short-run the relationship between economic growth and unemployment rate is not a closer one. It is usual for the unemployment rate to fall sustainably sometimes after other broad economic measures become positive. So, it is referred to as a lagging economic indicator. One reason that unemployment may not fall when there is economic growth after the end of the recession is that some firms may have underutilized employees on their payrolls which is the total amount of money an employer pays to the employee.so, employers may be able to increase output initially to meet rising demand without hiring additional workers by increasing the productivity of current employees. So this indicates that jobless growth has occurred in the economy. India uses labour saving technology. So even though output rises, employment falls.

Once the labour is fully utilized output can't grow faster than productivity growth until firm starts to hire workers. As long as growth in real GDP exceeds growth in labour productivity, employment will rise and if employment growth is more than growth in labour force then unemployment rate falls.

Over a longer period of time, there is a inverse relationship between real GDP growth and unemployment rate. This relationship was defined by an economist named Arthur Okun in 1960s and his law is known as Okun's law which states that when unemployment rate falls by 1% Gross National Product (GNP) rises by 3%.

Some of the characteristics of unemployment includes: it leads to slow economic progress, seasonal unemployment as a large part of the population depends on agriculture and it is found that agriculture is seasonal , lack of alternative employment opportunities, slow industrialization, poverty, faulty planning, decline of cottage and small industries and social customs. It is found that higher the population growth rate greater will be the unemployment rate as the job opportunities does not grow at the same rate with the population growth rate.

During the session on Unemployment, Underemployment and Population in the International Meeting on Population and Social Development in Copenhagen on March, 1995, it was stated that the problem of unemployment was the condition where the labour supply of a nation was not matched with the labour demand of a nation or job opportunities. The supply of labour required certain demographic factors and the one which were important are:

- Size and rate of growth of population which were considered to be as a function of birth rate, death rate and migration and
- Age structure of population which was the product of the rate of growth of population and its distribution.

An imbalance between the supply of labour and demand for labour gave rise to unemployment and underemployment. The vicious cycle associated with the youth led to low savings and investment thus resulting to low standard of living and low economic growth. This cycle can be broken at only two points: at high fertility stage and at the stage of low economic growth.

Sex composition of the human population is one of the basic demographic characteristics. A change in sex composition reflects the socio-economic and the cultural patterns of the society in different ways. So sex ratio is defined as the number of females per 1000 males in the population. As per Census 2011, in West Bengal the sex ratio is 950 females per 1000 males and in 2001 it was 934 females per 1000 males. So, it is found that the sex ratio increased from 2001 to 2011.

2. Motivation

It is found that most of the countries in the world suffer from the problem of unemployment and it is clear that wealthier a nation is, the better it will be able to deal with the problem of unemployment. In well-developed states people are replaced by machines, robots and computers at work and as a result of this they have no work to do and become jobless. It is found that inventions which substitute people are cheaper in exploitation.
One of the many factors causing unemployment is the workers high cost of maintenance. A useful suggestion is that those who are searching for jobs would be to take up more trainings or education, to gain new skills associated with the needs of a market.
As a result people would have proper qualifications for types of jobs available.
Furthermore, the unemployment rate is a useful measure of the underutilization of the supply of labour which reflects the inability of an economy to generate employment for those people who want to work but are not doing so, even though they are available for employment and seeking for work actively.

Unemployment is also an important macroeconomic indicator for several reasons. The amount of unemployment indicates how well an economy is operating. Unemployment means we are not using our labour efficiently, so we are not producing the maximum goods or services that we could.

It is also found that a low rate of unemployment can have negative signs in the economy which gives rise to inflation and reduced productivity. Low unemployment on the other hand is regarded as the positive sign for the economy.

3. Literature Review

The unemployment rate among the young people is much more sensitive at the economic cycles than the unemployment rate among the adults, during the period of recessions the number of unemployed youths tends to increase faster and also tends to decrease in the same way during the period of boom or during the period of economic increase than the number of unemployed adults. So, it is found that most of the studies conclude the fact that the aggregated economic performance represents an important factor for the unemployment rate among the youth (Blanchflower, 2000)

According to Contini (2010), the unemployment among the youth represents a function of the macroeconomic condition existent regulations within the work market, respectively of the existent regulations within the work market. The countries with the increased rate of economic development provide the basis of creating new jobs.

The countries with low rate of economic development where the business environment does not encourage the startups present increased rate of unemployment among youth (ILO, 2011).

The study realized by Dimian (2011) investigates the performance of work market at the level of young population and their influence on the future development in the social and economic sphere within the countries from Central and East Europe. This analysis shows the fact that the tax rates applied to the labour market have impact on the unemployment rate registered for the youth.

Other empiric researches on the unemployment problem among youth also contain the study realized by Dimitrov (2012), who examines this aspect among the youth and some factors like the weak quality of the educational system and economic cycles which represents the key determinant of increased unemployment among the youth. If both parents or one of them are

part of these categories : unemployed people, inactive people, people with low educational degree, people without qualifications and people with low income there is a bigger risk for their descendants to suffer from the same problem.

Concerning the educational system, it is found that literature indicates the fact that unemployment rates among youth whose qualification is low tends to be higher than unemployment rate among population having a higher qualification.

According to International Labour Organization (ILO) the unemployment among young men is related to the age when they leave the educational system, respectively the microeconomic condition and business environment.

Female labour supply has been a subject of widespread economic enquiry for many decades (Altonji and Blank, 1999; Blau and Kahn, 2013). At the micro level economists have studied the effects of cognitive development and schooling of children (Blau and Grossberg, 1992; Brooks- Gunn, Han and Waldfogel, 2002, Ruhn, 2004) whereas at the macro level various studies document the relation between female labour force participation and economic growth (Bhatotra and Umana- Aponte, 2010; Klasen and Pieters, 2012). There is also an extensive literature on the complex relations between female labour supply and fertility decision of particular interest to us in the wave of relatively recent literature that studies the role of culture and attitudes in determining economic outcomes (Almond et.al, 2013), particularly female labour supply (Antecol, 2003, Fernandez, 2007). Culture, though hard to quantify, could play an important role in explaining difference in outcomes for females across social groups, religion and even regions.

4. Objective

The study is based on secondary data from Census. Our study is based on census 2011. One of the objectives of our study is to analyze the factors that are responsible for the unemployment rate and labour force participation rate in West Bengal. One more objective is to find out the factors on which unemployment rate depends. The factors on which unemployment rate depends are caste system, population increase, slow growth in industrialization, less savings and investment. Another objective is to determine how literacy rate and sex ratio affects unemployment rate and work force participation rate in West Bengal.

By analyzing the data, collected in unemployment rate, work force participation rate, sex ratio and literacy rate we will show the changes in unemployment rate and work force participation rate in West Bengal. In this paper we will show the interrelation between unemployment rate, sex ratio, literacy rate and work force participation rate in West Bengal by using multiple regression model.

5. Methodology

Research on employment and unemployment rate should be done on the basis of survey, which are undertaken to collect the information. From that survey data, we have to form a descriptive statistics and then analyze the whole matter. Due to the present pandemic situation, it is not possible to conduct a survey and collect data. That's why the study is based on secondary data.

To continue the research we used different secondary data which we have collected from different websites of Census of India. In this paper we have used data on district wise unemployment rate, labour force participation rate, sex ratio and literacy rate collected from District level pooled estimates of key employment and unemployment indicators of West Bengal, Census of India, Bureau of Applied Economics and Statistics.

Now we will see by using the simple descriptive statistics that what will be the values of the endogenous variables of our regression equations which are the unemployment rate and labour force participation rate. We will construct different figures and tables for different years to see how the endogenous variables of our regression equation have changed. Now, in the objective as we have already discussed how literacy rate and sex ratio affects unemployment rate and labour force participation rate to study it we will be using a 3- variable model with the help of Classical Linear Regression Model. And the core factors that we will obtain to see that whether they are statistically significant or not we will have to perform the t- test and we will perform f-test to check whether that overall regression is statistically significant or not.

6. Results

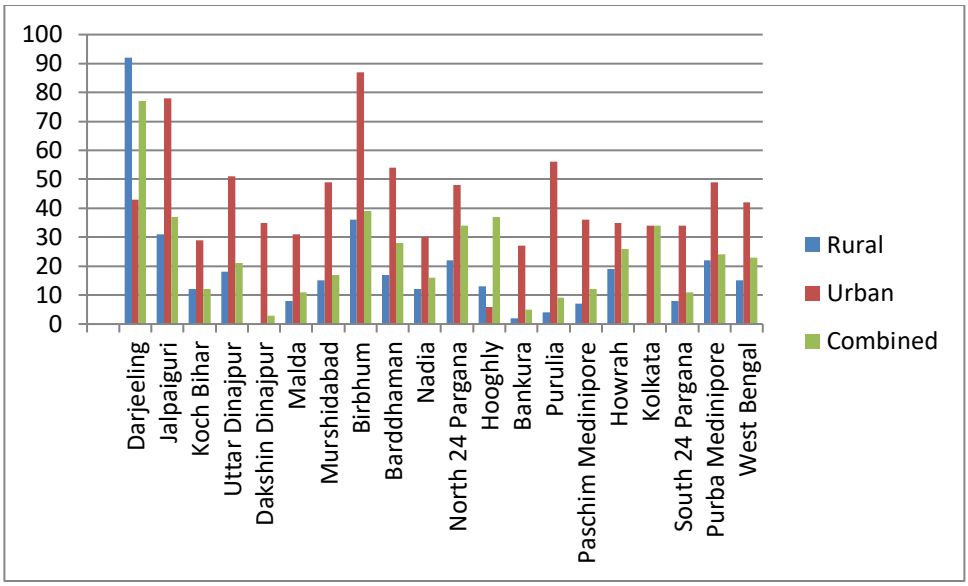
This study considers district-wise unemployment rate in West Bengal during 2009-10. The following table on unemployment rate also considers the rural, urban and combined unemployment rate for 19 districts in West Bengal. Here we also consider district wise labour force participation rate, literacy rate and sex ratio.

Table 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	Koch Bihar	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 Pargana	22	48	34
12	Hooghly	13	6	37
13	Bankura	2	27	5
14	Purulia	4	56	9
15	Paschim Medinipore	7	36	12
16	Howrah	19	35	26
17	Kolkata		34	34
18	South 24 Pargana	8	34	11
19	Purba Medinipore	22	49	24
20	West Bengal	15	42	23

Source : District level pooled estimates of key employment and Unemployment Indicators of West Bengal in 2009-10

From this table we can conclude that in the case of the rural unemployment the mean is 14.47, the median is 13, the mode is 12, the range is 36, the skewness is 0.64 and the standard deviation is 9.74. For urban unemployment the mean is 42.72, the median is 35.5, the mode is 35, the range is 81, the skewness is 0.72 and the standard deviation is 18.92. So, it is observed that the mean, median, mode, range, skewness and the standard deviation for the urban unemployment is more than that for the rural unemployment.



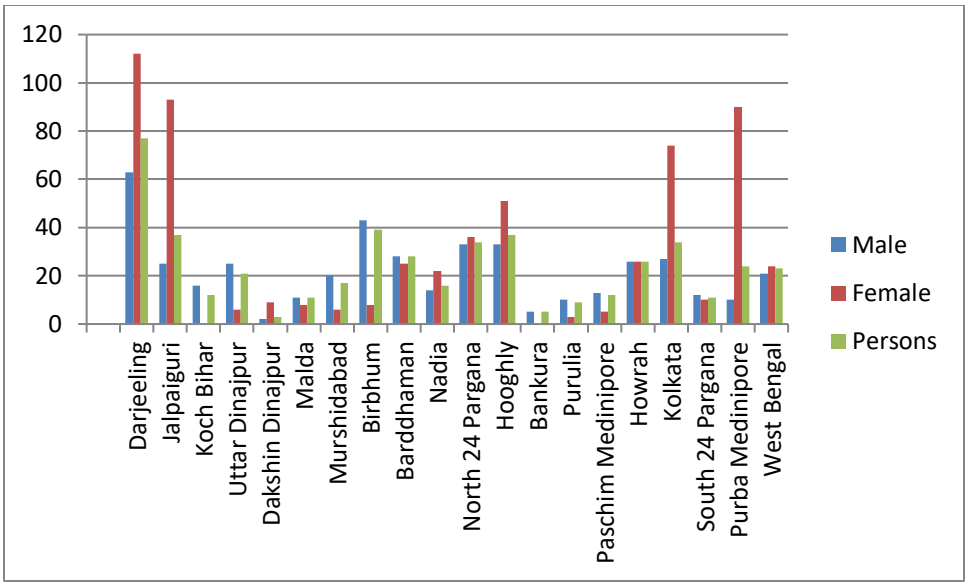
By seeing both the table and the bar diagram we can say that the rural unemployment rate is highest in Darjeeling and is absent in Kolkata and Dakshin Dinajpur. However the rural unemployment rate is lower in Bankura, Purulia, Paschim Medinipore and Malda as compared to the other districts in West Bengal. The urban unemployment rate is highest in Jalpaiguri and lowest in Hooghly. However if we consider the combination of both the rural and urban unemployment rate it is clearly seen from the table that the unemployment rate is highest in Darjeeling and lowest in Dakshin Dinajpur. It is also seen that the unemployment rate in Bankura and Purulia is lower as compared to the other districts of West Bengal.

Table 2 District-wise unemployment rate in West Bengal under usual activity status by sex during 2009-10 (per 1000 persons)

District	Male	Female	Persons
Darjeeling	63	112	77
Jalpaiguri	25	93	37
Koch Bihar	16	0	12
Uttar Dinajpur	25	6	21
Dakshin Dinajpur	2	9	3
Malda	11	8	11
Murshidabad	20	6	17
Birbhum	43	8	39
Barddhaman	28	25	28
Nadia	14	22	16
North 24 Pargana	33	36	34
Hooghly	33	51	37
Bankura	5	0	5
Purulia	10	3	9
Paschim Medinipore	13	5	12
Howrah	26	26	26
Kolkata	27	74	34
South 24 Pargana	12	10	11
Purba Medinipore	10	90	24

Source : District level pooled estimates of key employment and Unemployment Indicators of West Bengal in 2009-10

From this table we can conclude that in the case of the unemployment for males the mean is 19.61, the median is 18, the mode is 25, the range is 41, the skewness is 0.36 and the standard deviation is 11.00. For female unemployment the mean is 26.22, the median is 9.5, the range is 93, the skewness is 1.35 and the standard deviation is 30.63. So, here in this case it is observed that the mean, mode, range, skewness and standard deviation for the female unemployment rate is more than that of the male unemployment rate. But for the male unemployment rate the median is greater than that of the female unemployment rate.



Here also by seeing the table and the bar diagram we will be able to see that the unemployment rate among males is highest in Darjeeling and is lowest in Dakshin Dinajpur. However the unemployment rate among the males is also lower in Bankura, Purulia, South 24 Pargana and Purba Medinipore is lower as compared to the other districts of West Bengal. The unemployment rate among the females is highest in Darjeeling and is absent in Koch Bihar and Bankura. It is also lower in Uttar Dinajpur, Paschim Dinajpur, Malda, Murshidabad, Birbhum and Purulia as well

Table 3 Unemployment rate among the youths (15-29 years) under the usual principal status by age- group and sex

Sector	Male				Female				Persons			
	15-19	20-24	25-29	15-29	15-19	20-24	25-29	15-29	15-19	20-24	25-29	15-29
Year: 2011-12												
Rural												
West Bengal	213	89	44	100	108	147	110	122	193	100	54	103
All- India	114	69	28	61	80	99	58	78	105	76	34	65
Urban												
West Bengal	183	158	116	145	316	289	152	229	215	182	123	162
All- India	144	116	53	89	153	219	108	156	145	137	62	102
Year:2009-10												
Rural												
West Bengal	133	66	23	67	176	152	40	120	138	76	26	74
All- India	100	64	22	55	74	86	45	65	94	68	27	57
Urban												
West Bengal	176	162	71	122	337	297	289	300	208	186	124	160
All- India	132	101	44	79	143	217	146	172	133	124	62	96
Year:2004-05												
Rural												
West Bengal	126	80	26	72	222	210	49	163	145	99	30	86
All- India	79	62	23	52	67	93	52	70	75	70	33	57
Urban												
West Bengal	245	166	108	156	108	353	183	227	209	197	120	168
All- India	140	125	58	100	156	258	158	199	145	152	76	119
Year:1999-2000												
Rural												
West Bengal	107	92	39	75	87	88	39	72	102	91	38	74
All- India	65	62	32	51	41	49	24	37	57	58	28	46
Urban												
West Bengal	262	250	126	201	143	383	181	238	241	270	136	207
All- India	154	139	75	115	155	226	115	166	154	154	82	124
Year:1993-94												
Rural												
West Bengal	65	87	46	66	37	140	46	74	61	95	47	67
All- India	47	67	32	48	33	45	19	32	42	60	27	44
Urban												
West Bengal	213	252	156	199	180	576	288	403	210	334	178	240
All- India	134	139	67	108	168	277	129	194	141	165	78	124

Source: NSS Report No. 554, 537, 515(Part 1), 458(Part 1), 409

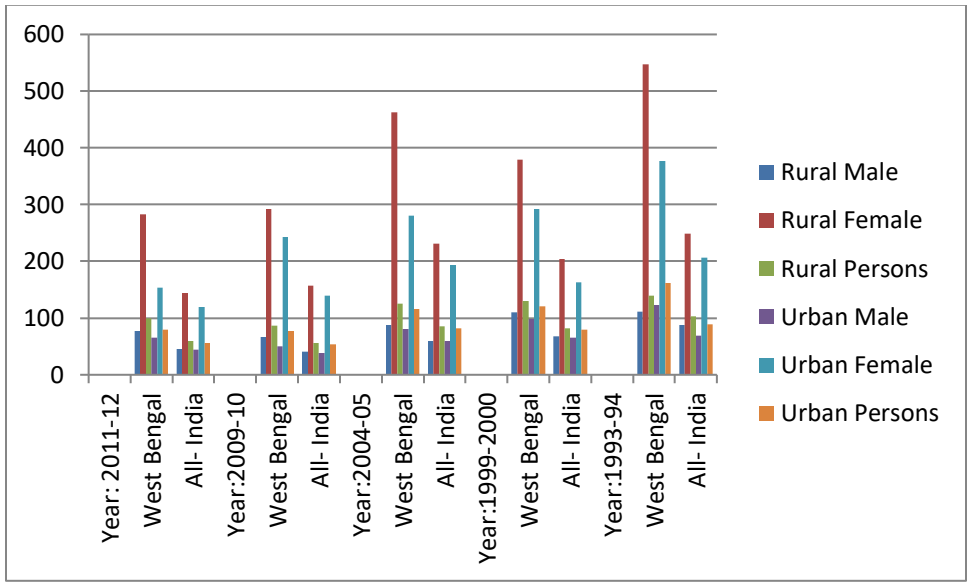
By observing this table, we can conclude that for the years 2011-12, 2009-10, 2004-05, 1999-2000 and 1993-94 both the rural and urban unemployment for males, females and persons is

higher in West Bengal compared to all-India. In the year 2011-12 the rural unemployment in West Bengal for the males is highest for the age group 15-19 and for females the rural unemployment rate in West Bengal is highest for the age group 20-24 and the urban unemployment rate for males in West Bengal is highest for the age group 15-19 and that for females it is highest for the age group 15-19. In the year 2009-10 the rural unemployment for the males in West Bengal is highest for the age group 15-19 and for females the rural unemployment rate is highest for the age group 15-19 and the urban unemployment rate for males in West Bengal is highest for the age group 15-19 and that for females it is highest for the age group 15-19. In the year 2004-05 the rural unemployment for the males in West Bengal is highest for the age group 15-19 and for females the rural unemployment rate in West Bengal is highest for the age group 15-19and the urban unemployment rate for males in West Bengal is highest for the age group 15-19 and that for females it is highest for the age group 20-24. In the year 1999-2000 the rural unemployment for the males in West Bengal is highest for the age group 15-19 and for females the rural unemployment rate in West Bengal is highest for the age group 20-24 and the urban unemployment rate for males in West Bengal is highest for the age group 15-19 and that for females it is highest for the age group 20-24. In the year 1993-94 the rural unemployment for the males in West Bengal is highest for the age group 20-24 and for females the rural unemployment rate in West Bengal is highest for the age group 20-24 and the urban unemployment rate for males in West Bengal is highest for the age group 20-24 and that for females it is highest for the age group 20-24.

Table 4 Unemployment rate among the usual principal status for the educated (15 years and above)

Sector	Rural			Urban		
	Male	Female	Persons	Male	Female	Persons
Year: 2011-12						
West Bengal	77	283	99	66	153	80
All- India	45	144	60	44	119	56
Year:2009-10						
West Bengal	67	292	86	50	243	77
All- India	41	157	56	38	139	54
Year:2004-05						
West Bengal	88	463	125	81	280	116
All- India	59	231	85	60	194	82
Year:1999-2000						
West Bengal	110	379	130	98	292	121
All- India	68	204	82	66	163	79
Year:1993-94						
West Bengal	111	547	140	123	377	162
All- India	88	249	103	69	206	89

Source: NSS Report No. 554, 537, 515(Part 1), 458(Part 1), 409



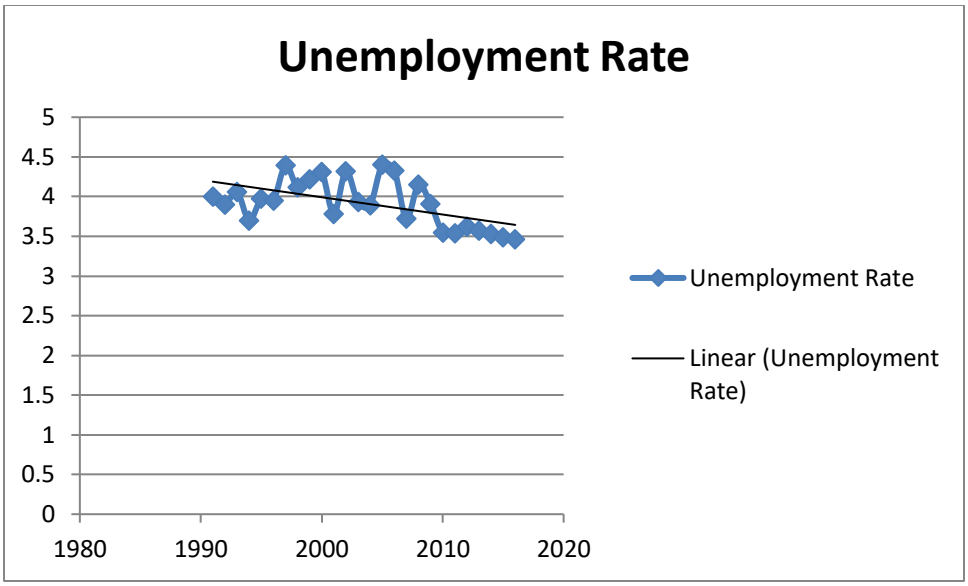
In the year 2011-12 the rural unemployment rate in West Bengal is highest for females and the urban unemployment rate in West Bengal is also highest for females compared to all- India. In the year 2009-10 the rural unemployment rate in West Bengal is highest for females and the urban

unemployment rate in West Bengal is also highest for females compared to all- India. In the year 2004-05 the rural unemployment rate in West Bengal is highest for females and the urban unemployment rate in West Bengal is also highest for females compared to all- India. In the year 1999-2000 the rural unemployment rate in West Bengal is highest for females and the urban unemployment rate in West Bengal is also highest for females compared to all- India. In the year 1993-94 the rural unemployment rate in West Bengal is highest for females and the urban unemployment rate in West Bengal is also highest for females compared to all- India.

Table 5 Unemployment rate: An empirical study of Indian Economy

Year	Unemployment Rate
1991	4
1992	3.9
1993	4.06
1994	3.7
1995	3.97
1996	3.95
1997	4.39
1998	4.12
1999	4.22
2000	4.31
2001	3.78
2002	4.32
2003	3.93
2004	3.89
2005	4.4
2006	4.33
2007	3.72
2008	4.15
2009	3.91
2010	3.55
2011	3.54
2012	3.62
2013	3.57
2014	3.53
2015	3.49
2016	3.46

From this table we can conclude that the mean is 3.91, the median is 3.91, the range is 0.94, the skewness is -0.12 and the standard deviation is 0.31.



By observing both the table and the above diagram we can conclude that the unemployment rate varies with different years ranging from 1991-2016.

Table 6 Literacy rate in West Bengal by Districts (in percent)

District	Literacy Rate					
	Person		Male		Female	
	2001	2011	2001	2011	2001	2011
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	74.9	87.02	84.91	92.32	64.42	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
North 24 Parganas	78.07	84.06	83.92	87.6	71.72	80.34
South 24 Parganas	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
Koch Bihar	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: Directorate of Census Operation, West Bengal

From this table we can conclude that in the year 2001 in the case of the literacy rate for males the mean is 75.30, the median is 76.34, the mode is 84.91, the range is 26.43, the skewness is -0.83 and the standard deviation is 8.75 and for the year 2011 the mean is 80.59, the median is 80.38, the standard deviation is 7.51, the range is 26.8 and the skewness is -0.70. In the year 2001 in the case of the literacy rate for females the mean is 56.79, the median is 57.57, the mode is 64.42, the range is 40.8, the skewness is -0.21 and the standard deviation is 11.77 and for the year 2011 the mean is 68.69, the median is 69.49, the standard deviation is 9.76, the range is 33.54 and the skewness is -0.60. It is found that for the year 2011, the mean, median, skewness and range of the male literacy rate is higher and only the standard deviation is lower as compared to the year 2001. And it is also observed that for the year 2011, the mean and median of the female literacy rate is higher but the range, skewness and standard deviation is lower as compared to the year 2001. We can also conclude that the

literacy rate for males in the year 2011 is higher than the year 2001 for all the districts and also the literacy rate for females in the year 2011 is higher than that of the year 2001.

From this table we can conclude that in the year 2001 the literacy for males was highest in Purba Medinipore and Paschim Medinipore but in the year 2011 the male literacy rate was highest in Purba Medinipore only. It is also found that in both 2001 and 2011 the male literacy rate was lowest in Uttar Dinajpur. In the year 2001 the female literacy rate was highest in Kolkata and lowest in Purulia whereas also in the year 2011 the female literacy rate was highest in Kolkata and lowest in Purulia. It is also found that the overall literacy rate for male, female and persons increased in 2011 as compared to 2001 for all the districts in West Bengal.

Table 7 Density of Population and Sex Ratio in Urban and Rural areas of the Districts of West Bengal (Provisional)

	Density of Population			Sex Ratio					
	2001			2001			2011(P)		
District	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
West Bengal	676	6746	903	950	893	934	950	939	947
Burdwan	699	3183	982	942	888	922	953	928	943
Birbhum	613	5170	663	950	950	950	955	962	956
Bankura	434	3826	464	952	951	952	954	958	954
Purba Mednipur	630	2554	556	963	945	961	959	967	960
Paschim Mednipur	630	2554	933	950	918	947	937	928	936
Howrah	1700	3816	2913	958	858	906	949	927	935
Hooghly	1137	8489	1601	973	897	947	966	946	958
North 24 Parganas	1136	9710	2182	942	912	926	944	953	949
South 24 Parganas	595	6145	693	942	913	937	948	954	949
Kolkata		24718	24718		829	829	0	899	899
Nadia	975	4661	1173	941	962	946	941	963	947
Murshidabad	988	5685	1102	950	971	952	953	973	957
Uttar Dinajpur	694	6638	778	945	893	938	938	918	936
Dakshin Dinajpur	595	8672	677	950	958	951	950	977	954
Malda	823	9497	881	948	947	948	947	893	939
Jalpaiguri	458	5013	546	944	933	942	954	955	954
Darjeeling	354	6918	511	956	899	937	968	974	971
Koch Bihar	674	5458	732	947	964	949	938	974	942
Purulia	369	3218	405	958	920	954	958	936	955

Source: Census Reports

From this table we can conclude that in the year 2001 in the case of the sex ratio for rural areas the mean is 951.11, the median is 950, the mode is 950, the range is 32, the skewness is 1.16 and the standard deviation is 8.40 and the sex ratio for urban areas the mean is 923.33, the median is 926.5, the standard deviation is 38.25, the range is 142 and the skewness is -0.100. In the year 2011 in the case of the sex ratio for rural areas the mean is 897.72, the median is 949.5, the mode is 954, the range is 968, the skewness is -4.23 and the standard deviation is 224.22 and the sex ratio for urban areas the mean is 947.61, the median is 954.5, the mode is 974, the standard deviation is 25.58, the range is 84 and the skewness is -0.90. It is observed that for the year 2001, the mean, the median and skewness of the sex ratio in rural areas is higher but the range and standard deviation is lower as compared to that of the urban areas. It is also observed that for the year 2011, the standard deviation, the range and skewness of the sex ratio in rural areas is higher but the mean, the median and the mode is lower as compared to that of the urban areas. In other words it can also be concluded that for the year 2001, the mean, the median and skewness of the sex ratio in rural

areas is higher but the mode, the range and standard deviation is lower as compared to that of the year 2011. It is also observed that for the year 2001, the standard deviation, the range and skewness of the sex ratio in urban areas is higher but the mean and the median is lower as compared to that of the year 2011.

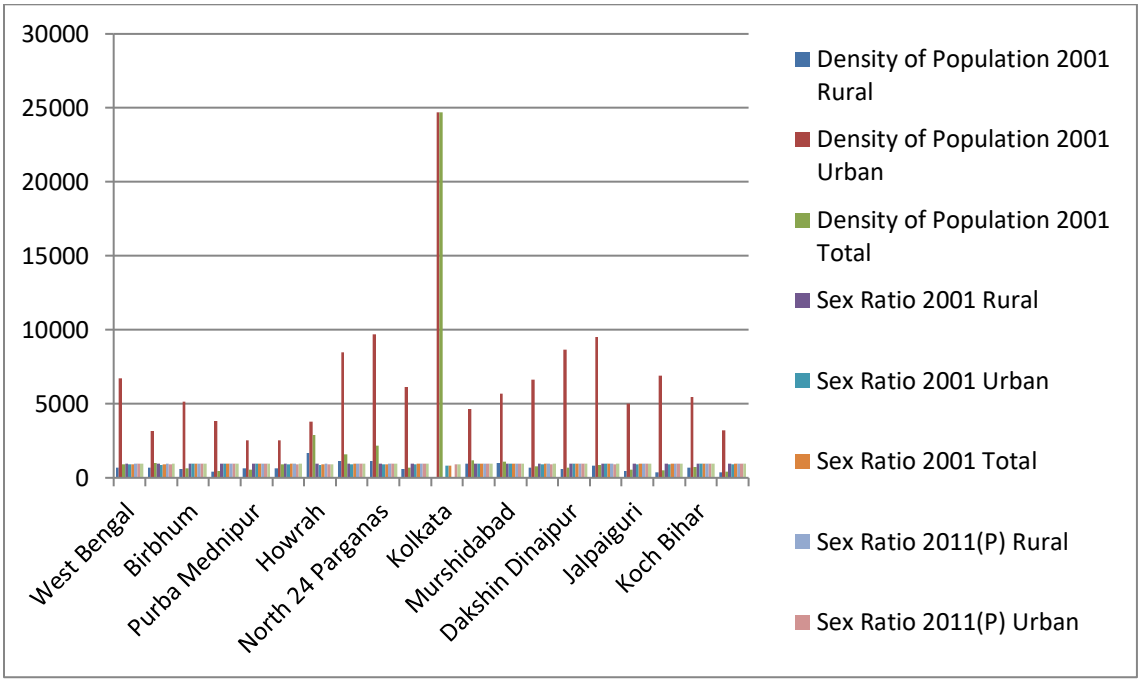


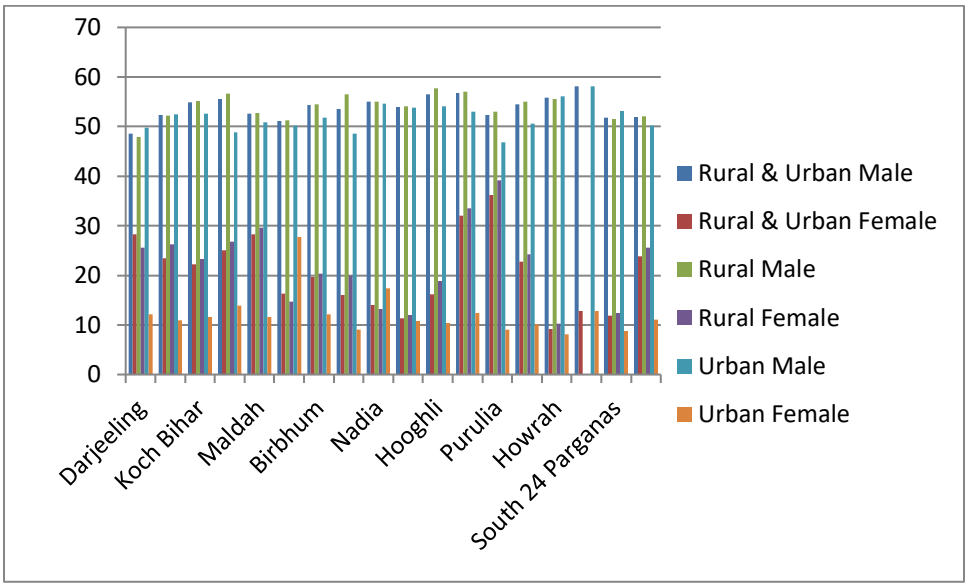
Table 8 Work Participation Rate in various districts of West Bengal by Sex and Region 2001 (in percent)

Districts	Rural & Urban		Rural		Urban	
	Male	Female	Male	Female	Male	Female
Darjeeling	48.51	28.31	47.92	25.65	49.72	12.16
Jalpaiguri	52.27	23.5	52.24	26.2	52.43	11
Koch Bihar	54.91	22.22	55.14	23.28	52.67	11.65
DakshinDinajpur	55.62	25.11	56.65	26.85	48.78	13.84
Maldah	52.55	28.29	52.69	29.6	50.81	11.59
Murshidabad	51.14	16.37	51.27	14.74	50.23	27.67
Birbhum	54.3	19.65	54.54	20.35	51.83	12.2
Bardhaman	53.53	16.03	56.51	19.98	48.59	9.09
Nadia	54.96	14.07	55.06	13.17	54.57	17.37
North 24 Parganas	53.93	11.33	54.07	11.98	53.81	10.78
Hooghli	56.5	16.16	57.75	18.91	54.13	10.46
Bankura	56.75	32.04	57.05	33.53	53.04	12.42
Purulia	52.31	36.21	52.94	39.2	46.79	9
Midnapore	54.5	22.82	54.96	24.26	50.58	10.08
Howrah	55.85	9.19	55.52	10.29	56.16	8.05
Kolkata	58.06	12.84			58.06	12.84
South 24 Parganas	51.82	11.83	51.58	12.39	53.08	8.77
Uttar Dinajpur	51.89	23.84	52.12	25.54	50.23	11.11

Source: Census of India, 2001, West Bengal

From this table we can conclude that in the case of the work force participation rate in rural areas for males the mean is 54.38, the median is 54.75, the range is 6.48, the skewness is -0.002 and the standard deviation is 2.05 and for females the mean is 21.89, the median is 21.82, the standard deviation is 8.26, the range is 28.91and the skewness is 0.40. In the case of the work force participation rate in urban areas for males the mean is 52.11, the median is 52.43, the range is 11.27, the skewness is 0.18 and the standard deviation is 2.85 and for females the mean is 12.23, the median is 11.11, the standard deviation is 4.55, the range is19.62 and the skewness is 2.725. It is observed that the mean and the median of the work force participation rate for rural males is higher but the range, the skewness and standard deviation is lower as compared to that of the rural females . It is also observed that the mean and the median of the work force participation rate for urban males is higher but the range, the skewness and standard deviation is lower as compared to that of the urban females. In other words it can also be concluded that the mean and the median of the work force participation rate for rural males is higher but the range, the skewness and standard deviation is lower as compared to that of the urban males. It is also observed that the mean, the

median, the range and the standard deviation of the work force participation rate for rural females is higher but only the skewness is lower as compared to that of the urban females.



In rural areas the male labour force participation rate is highest in Hooghly and is lowest in Darjeeling and the female labour force participation rate is highest in Purulia and is lowest in Howrah. In urban areas the male labour force participation rate is highest in Kolkata and lowest in Purulia and the female labour force participation rate is highest in Murshidabad and lowest in Howrah. However in both rural and urban areas the labour force participation rate for females is lower than that for males.

Regression Analysis

District	Unemployment rate	Literacy rate	Sex Ratio
Darjeeling	77	79.56	970
Jalpaiguri	37	73.25	953
Koch Bihar	12	74.78	942
Uttar Dinajpur	21	59.07	939
Dakshin Dinajpur	3	72.82	956
Malda	11	61.73	944
Murshidabad	17	66.59	958
Birbhum	39	70.68	956
Barddhaman	28	76.21	945
Nadia	16	74.97	947
North 24 Pargana	34	84.06	955
Hooghly	37	81.8	961
Bankura	5	70.26	957
Purulia	9	64.48	957
Paschim Medinipor	12	78	966
Howrah	26	89.31	939
Kolkata	34	86.31	908
South 24 Pargana	11	77.51	956
Purba Medinipore	24	87.02	938

In determining the interrelation, the study fits a multiple linear regression model where the unemployment rate is the dependent variable and is regressed upon sex ratio and literacy rate which are the dependent variables. The model specification is as follows:

$Y_i = \alpha + ß_1X_{1i} + ß_2X_{2i} + Ɛ_i$ ------- (1)

Where, i= 1, 2, 3... 19;

Y_i = Unemployment rate; X_{1i} = Literacy rate; X_{2i} = Sex ratio; α, $ß_1$ and $ß_2$ are unknown parameters; and $Ɛ_i$ is the disturbance term.

Estimating equation (1) by OLS method, we get

$\hat{Y}_i = \hat{\alpha} + \hat{ß}_1X_{1i} + \hat{ß}_2 X_{2i}$------ (2)

$\hat{\alpha}$ and $\hat{ß}$ are the numerical estimate of α and ß,

$\hat{Y}_i$ gives the estimated values of Y_i for different values of X_{1i} and X_{2i}

Estimated values are:

$\bar{Y} = 23.8$,

$\bar{X}_{1i} = 75.18$, $\bar{X}_{2i} = 948.84$,

$\sum x_{1i}^2 = 1302.678$, $\sum x_{2i}^2 = 3364.53$, $\sum y_i^2 = 16167$, $\sum x_{1i}y = 987.29$ $\sum x_{2i}y = 460.53$,

$\sum x_{1i}x_{2i} = -469.47$

Estimated values of slope parameters are:

$\hat{\alpha} = -72.6$, $\hat{ß}_1 = 0.85$, $\hat{ß}_2 = 0.26$

Hypothesis testing:

For testing the significance of $\hat{ß}_1$ and $\hat{ß}_2$ we have to test the validity of null hypothesis (H_N) that the value of $\hat{ß}_1$ and $\hat{ß}_2$ is equal to 0 against the alternative hypothesis (H_A) is not equal to 0. We set our hypothesis as

H_N: $\hat{ß}_1 = 0$

H_A: $\hat{ß}_1 \neq 0$

Now we have to compute t- value, which is denoted by t^*. The formula for computing t^* is

$|t^*| = \hat{ß}_1 / SE(\hat{ß}_1)$

$= (0.85)/ (0.32)$

$= 2.66$

Where, $SE(\hat{ß}_1)$ is the standard error of $\hat{ß}_1$.

Estimated value of $|t^*|$ is 2.66. Now, we have to compare the value of $|t^*|$ with critical value of t from the t- table for the significance of $\lambda/2$ and degrees of freedom n-k-1. Here n is the number of observations i.e.; 19.

At 5% level of significance $t_{\lambda/2}$, (n-3) is 2.120

We see that $|t^*| > t_{\lambda/2}$,(n-3) i.e.; absolute value of computed-t is greater than the value of critical-t at 5% level of significance $\lambda/2$ and degree of freedom i.e.; 16. So H_N is rejected and we can conclude that $\hat{ß}_1$ is statistically significant at 5% level of significance.

H_N: $\hat{ß}_2 = 0$

H_A: $\hat{ß}_2 \neq 0$

Now we have to compute t- value, which is denoted by t^*. The formula for computing t^* is

$|t^*| = \hat{ß}_2 / SE(\hat{ß}_2)$

$= (0.26)/ (0.22)$

$= 1.18$

Where, $SE(\hat{ß}_2)$ is the standard error of $\hat{ß}_2$.

Estimated value of $|t^*|$ is 1.18. Now, we have to compare the value of $|t^*|$ with critical value of t from the t- table for the significance of $\lambda/2$ and degrees of freedom n-k-1. Here n is the number of observations i.e.; 19.

At 5% level of significance $t_{\lambda/2}$, (n-3) is 2.120

We see that $|t^*| < t_{\lambda/2}$,(n-3) i.e.; absolute value of computed-t is lesser than the value of critical-t at 5% level of significance $\lambda/2$ and degree of freedom i.e.; 16. So H_N is accepted and we can conclude that $\hat{\beta}_2$ is not statistically significant at 5% level of significance.

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

H_N: $\hat{\beta}_{1=}\ \hat{\beta}_2=0$;

H_A: not all ß's are simultaneously 0;

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

Estimated value of $F^*$is 1.86. Now, we have to compare the value of F^* with the critical F- value from the table for the 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 0.19.

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

The value of R- square is 0.198 and adjusted- R^2 is 0.092.

So we can clearly see that 19.8% of the dependent variable is explained by explanatory variables.

Hence, we can conclude that as literacy rate increases there is an increase in the unemployment rate, which is a counterintuitive result and it is also found that the sex ratio has no relation with the unemployment rate and it is statistically insignificant Or in other words we can conclude that unemployment rate has a positive relationship with the literacy rate.

7. Policy Suggestions

The policy suggestions that are to be made in the light of the above findings are as follows:
As we have already seen that with the increase in the literacy rate the unemployment rate increases so it is a counterintuitive result. It is found that gradually with the passage of time more people are getting educated. It's not the only reason that people are getting educated just to get a job there are many other reasons as well. To earn a basic living a minimum level of education is required so it's another reason why people are getting educated apart from getting a job. In West Bengal the unemployment rate is higher as population increases at a higher rate than that of job vacancies so unemployment rate increase with the increase in literacy rate. It's because of the reason that the supply of literates is much more than the demand for literates. The literacy rate is found to be highest in Howrah and is lowest in Uttar Dinajpur. It is also seen that sex ratio has no relation with unemployment rate and labour force participation rate. West Bengal for this reason is gender neutral state. And our result indicates that it is a good development parameter.
To avoid the situation of unemployment- explosion in the near future, several vigorous efforts are to be made to attain higher growth of employment in the state. In terms of our study, it is clear that such a goal would not materialize through traditional means of promoting the sectors such as agricultural sector and manufacturing sector. The employment elasticity for these two sectors has come down to a very low value which indicates their decreasing ability to generate additional employment in future. It is necessary that some structural changes are to be initiated within these sectors keeping in view the objective of creating new employment opportunities. It is also important that the role of private sector industries are recognized in right perspective and conductive atmosphere is created for their growth. The government must continue with enthusiasm, its current policy of supporting the private investors to establish new enterprises in state. In the urban areas the sectors like trade, hotels and restaurants, transport, storage and communication and construction needs to be promoted further because of relatively higher employment- enhancing capabilities.
Since the bulk of the future unemployment is very likely to be from rural areas, it would be necessary to put additional efforts towards more employment generation within rural areas. As we have mentioned above, some of this might be achieved through more diversification of crop-economy. However from the perspective of additional employment generation in rural areas, the potentiality of

rural non- farm sector needs to be 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. The potentiality of sectors as trade, transport, etc. in rural areas needs to be appreciated which designing promotional policies for different sectors. It is a pity that the rural industrial section is in stagnation in West Bengal due to lack of appropriate public support. In West Bengal since a good proportion of rural workers depend 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 analysis made presently shows the changes is the unemployment rate, labour force participation rate, sex ratio and literacy rate from 2001 to 2011 in West Bengal. It is seen that caste system, population increase, slow growth in industrialization, less savings and investment are the factors on which unemployment rate depends.

It is found that in the year 2009-2010 the rural unemployment rate in West Bengal under usual activity status by residence is highest in Darjeeling and is lowest in Dakshin Dinajpur and Bankura and the urban unemployment rate in West Bengal under usual activity status by residence is highest in Jalpaiguri and is lowest in Hooghly. It is found that in the year 2009-2010 the male unemployment rate in West Bengal under usual activity status by sex is highest in Darjeeling and is lowest in Dakshin Dinajpur and the female unemployment rate in West Bengal under usual activity status by sex is highest in Darjeeling and is lowest in Koch Bihar and Bankura. In the year 2001 the literacy for males is found to be highest in Purba Medinipore and Paschim Medinipore but in the year 2011 the male literacy rate was highest in Purba Medinipore only. It is also found that in both 2001 and 2011 the male literacy rate was lowest in Uttar Dinajpur. In the year 2001 the female literacy rate was highest in Kolkata and lowest in Purulia whereas also in the year 2011 the female literacy rate was highest in

Kolkata and lowest in Purulia. It is also found that the overall literacy rate for male, female and persons increased in 2011 as compared to 2001 for all the districts in West Bengal. In the year 2001, in rural areas the male labour force participation rate is found to be highest in Hooghly and is lowest in Darjeeling and the female labour force participation rate is highest in Purulia and is lowest in Howrah. In urban areas the male labour force participation rate is found to be highest in Kolkata and lowest in Purulia and the female labour force participation rate is highest in Murshidabad and lowest in Howrah. However in both rural and urban areas the labour force participation rate for females is lower than that for males.

From the regression analysis we have concluded that that as literacy rate increases there is an increase in the unemployment rate, which is a counterintuitive result and it is also found that the sex ratio has no relation with the unemployment rate as well as the labour force participation rate and it is statistically insignificant for both the cases. It is also seen that labour force participation rate increases with the increase in literacy rate. Or in other words we can conclude that unemployment rate and labour force participation rate has a positive relationship with the literacy rate.

9. Bibliography

- District level pooled estimates of key employment and Unemployment Indicators of West Bengal in 2009-10.
- NSS Report No. 554, 537, 515(Part 1), 458(Part 1), 409.
- Directorate of Census Operation, West Bengal.
- Census of India, 2001, West Bengal.
- Atlonji and Blank (1999), Race and Gender in Labour Market, Vol. 3, Part C, pp 3143-3259.
- Blanchflower (2000), Youth employment and joblessness in advanced countries, The University of Chicago Press, Chicago.
- Bhalotra, Umana- Aponte (2010), The Dynamics of Women's Labour Supply in Developing Countries.
- Blau and Kahn (2013), "Female Labour Supply. Why is the US falling behind?" American Economic Review 103(3): 251-256.
- Blau and Grossberg (1992), Maternal Labour Supply and Children's Cognitive Development, vol. 74, issue 3, 474-481.

- Brooks- Gunn, Han and Waldfogel (2002), maternal employment and child cognitive outcomes in the first three years of life: The NICHD study of early child Development, 73(4), 1052-1072.
- Contini (2010), Youth employment in Europe institutions and Social Capital explain better than Mainstream Economics, Discussion. Paper No. 4718. University of Torino.
- Dimian (2011), The Role of Education in Explaining Youth Labour Market Imbalance in CEE Countries, Journal on Efficiency and Responsibility in Education and Science, Vol. 4, No. 3, pp. 105-115.
- Dimitrov (2012), Youth Unemployment Trends on Bulgaria: Friedrich-Elbert-Stiftung.
- Fernandez (2007), Culture as Learning: The Evolution of Female Labour Force Participation over a Century (Working Paper No. 13373). National Bureau of Economic Research.
- ILO (2011), Global Employment Trends for Youth, Geneva.
- Klasen and Pieters (2012), Drivers of Female Labour Force Participation during India's Economic Boom.