Effect of Population and Sex on Employment Generation in Districts of West Bengal

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To

THE UNIVERSITY OF BURDWAN

(For B.Sc. Semester VI honours Examination)

College Roll no- 062 University Roll no- 180311600007

Registration No- 201801010526, Session- 2018-19

Course Name- Field Survey and Project Report

Course code- CC14

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1. INTRODUCTION

"Unemployment is like a headache or a high temperature

unpleasant and exhausting but not carrying in

itself any explanation of its cause".

-William Beverage

The employment situation in West Bengal has been decreasing in recent years due to the recession in the industrial sector and a low rate of absorption of the labour force into other sectors. Here the role of economic growth is very slow. This slow growth fails to provide enough unemployment opportunities to the increasing population. Constant increase in population has been a big problem in West Bengal. It is one of the main causes of unemployment. Besides, a large part of population in West Bengal is dependent on agriculture, but agriculture being seasonal provides work for a few months, so this increases unemployment. Defective planning is the one of the causes of unemployment, there is wide gap between supply and demand for labour. Mobility of labour in West Bengal is very low. Due to attachment to the family, people do not go far off areas for jobs. There are also some other factors like, language, religion, and climate etc. responsible for low mobility. Immobility of labour adds to unemployment.

Because of these reasons, unemployment is becoming the burning issue in West Bengal.

Unemployment adversely affects the disposable income of families, erodes purchasing power, diminishes employee morale and also reduces an economy's output. Due to unemployment labourers are exploited. They have to accept low wages and work under adverse conditions. Many social evils like dishonesty, gambling and immorality etc. arises due to unemployment, it causes social disruption in the society. Under the situation of unemployment a man has no source of income. It causes poverty, burden of debt increases, economic problems increase.

Unemployment creates poverty through the loss of income. With jobless comes a loss of income, and many families are left without sufficient income to meet living expenses. When individuals are forced to use savings to cover costs today, their future retirement funds are reduced. This creates negative long-term effects on the economy such as high levels of unemployment around the world. Today's unemployment will decrease the income of future retirees and increase the burden on the government.

In the developing world, women continue to form a large majority of the world's working poor, earn less income, and are more often affected by long-term unemployment than man. This is due to women's socio-economic disadvantages caused by gender based discrimination and their double roles of being a worker and a care taker for the society. Although, women continue to undertake most of unpaid care work, which has become an increasing challenge in their efforts to engage in productive work. Discrimination within households favours men in the allocation of productive resources, which translates into gender differences in scale of production, productivity, and growth capacity.

An increase in the labour force participation rate is commonly through to be associated with a rise in the unemployment rate, since labour force entrants must search for a job. While a temporary rise in participation may be associated with an increase in the unemployment rate in the short run, it is not clear why the unemployment rate should rise in response to a trend increase in participation.

If participation rises due to an increase in labour force attachment, workers become less likely to enter unemployment and decline. The changes in the participatory behaviour of women and men in the post-war period provide an ideal setting to examine the relationship between labour force participation and unemployment over a long horizon. Moreover, labour force participation remains the same, while the number of unemployment decreases and the number of employed increases. This would increase in the total labour force, but the number of unemployed remains unaffected, so the percentage of unemployed would decrease.

2. MOTIVATION

Unemployment means a person willing to work but unable to find a proper job. Our country is facing many problems but one of the serious problems is of unemployment. Many graduates, doctors, engineers, scientists are unemployed or working underemployed. Due to unemployment we are wasting our country's human resource. Unemployment creates various problems like – Unemployment and poverty goes in a parallel way. The problem of unemployment gives rise to poverty. Young people after a long time of unemployment find the wrong way to earn money, to get rid from the unemployment stress, they accept alcohol or drugs. An unemployed youth accepts suicide as the last option of their life. It is also a cause of lower economic growth, it also increases the rate in crimes, as the employed youth do not have anything to do they start doing robbery, murder etc. Besides, it invites various types of health issues that affect both physically and mentally.

About 71% of Indian men are part of the workforce, when considering persons aged 15 and above. However, only 22% of the country's female population is at work. The Ministry of Statistics and Programme Implementation (MOSPI) recently released the Period Labour Force Survey (PLFS) for 2017-18. The survey reveals gendered difference in workforce participation and wages earned.

The survey received much attention ahead of its release, while much of the focus has been on the unemployment rate touching s 45-year high; the survey data also reveals worrying trends in the increasingly more gender-skewed Indian workforce. Across all states, both in rural and urban areas, there are fewer women in the workforce, compared to men. Meghalaya is the only State where 50% of the female population is at work. In Bihar, merely 4% of its women are part of the workforce. Worker Population Ratio (WPR) indicates the number of people employed, per 1,000 people. A state wise comparison of the gender-based difference in WPR shows that the gap between the number of men and women at work is very severe in States like Assam (63.7 percentage points) and Bihar (59.7 percentage points). This gendered skew in workforce population ratio is lowest in Himachal Pradesh (23.5 percentage points), followed by Meghalaya (25.2 percentage points).

The rapidly growing population transforms the economy into mass unemployment and low employment. As the population increases, the ratio of the workers to the total population increases. The result is that with an increase in the labour force, unemployment and low employment increases. Rapid increment of the population reduces savings and investment, so unemployment takes place in this situation.

3. **LITERATURE REVIEW**

The study on Unemployment has drawn attention of many economists and social-scientists over the years. Partha Ray et.al.(2006) have focussed on the observed inverse relation between poverty and unemployment, which holds both at the aggregate level as also at various cross-sections. Arup Mitra et.al.(2013) discussed about youth employment and unemployment in India. They said that young Indians face major barriers because of poverty and low levels of human capital. Susmita Biswas (2016) examined unemployment in India and its current scenario. She also discussed over the various government policy initiatives taken to curb unemployment and its impact. Here the policy recommendations to improve the situation of unemployment prevailing in India. Anala Upadhya et.al.(2017) have discussed about the major causes of unemployment that is social problem and wrong government policies and social problem may be because of continues increasing population creates economic problem like rise in inflation,

company's threats, etc. M. Choudhry et.al.(2012) found that the impact of several institutions and policies on youth and total unemployment rates, for a large set of developed countries during the last three decades. Their empirical analysis shows that, in addition to economic growth, economic freedom, labour market reforms a high share of part time employment, and active labour market policies reduce unemployment and improve labour market performance.

M. Shoiab Mir et.al.(2016) pointed out that the effect of gender and birth order on quality of life among unemployed youth. The findings from their study indicate that gender and birth order have significant effect on quality of life. Results also show that male and second born unemployed person have good quality life then female and first born unemployed persons. It is concluded that both gender and birth order are influential factors of quality of life. S.K. Bhaumik (2002) had built some understanding of the employment and unemployment situation in West Bengal during past two decades or so. Apart from portraying emerging employment/unemployment scenarios, he attempts of employment/unemployment in West Bengal by the end of Tenth Plan period and offers some suggestions that might be useful to combat adverse situation on the employment/unemployment front. Joy Karmakar (2015) examined the spatial pattern of urban unemployment in West Bengal from 2001 to 2011; he focussed upon the changing spatial pattern of urban unemployment of west Bengal and to identify the factors that largely determine the urban unemployment of the state. Ms. Puja Sharma et.al. (2018) researched on one of the most disturbing problems in India has been the mounting rate of unemployment, both in rural and urban sectors.

In this context, the authors' observation on unemployment and its effects on economy, poverty and gender inequality is remarkable. These topics are critically examined and compared from different authors and scholars. Moreover, the reasons and factors of unemployment have clearly represented. They also used multiple conceptual and theoretical models and approaches. Instead of creating any confusion, the relation between different factors and its effects on the economy help us to understand the completeness of the subject unemployment.

4. OBJECTIVES

The study based on the secondary data collected from Census. The main objective of the study is to decrease the rate of unemployment in West Bengal. The study is based on the data of census 2001 and 2011. The specific objectives of the present study are as follows -

- To find the reasons for unemployment in West Bengal.

- To study the issues related to West Bengal and overall India's employment.
- To analyze problems and give their solutions related to unemployment in West Bengal.
- To find out the government initiatives for reducing unemployment.
- To determine work participation rate on population and sex ratio
- To find unemployment rate on population and sex ratio.

5. METHODOLOGY

Research on unemployment 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 then have to analyze the matter. Due to the present pandemic situation, it is not possible to conduct a survey and collect data. That's why this study is based on the secondary survey and existing literature.

The secondary data are collected from official website of census of India. The study is mainly based upon the data from 2001 and 2011 census. Using the data, the research study examines the issues of unemployment in depth. The study is about the unemployment situation created in West Bengal in recent years, it also includes the internal unemployment between districts. This study is thoroughly analyzed with the help of descriptive statistics, trends levels, bar diagram, pie chart and regression analysis.

6. RESULT AND DISCUSSION

The study has considered the cases between the districts of West Bengal. A study of the following table will show the district-wise participation and unemployment ratio.

Table-1. Ranking of districts on the basis of Percentage of Main Workers to Total Population in West Bengal,2001 & 2011

Rank in 2011	District	Work Participation Rate ,2011	District	Work Participation Rate,2001	Rank in 2001
1	Kolkata	35.06	Kolkata	35.51	1
2	Cooch Behar	31.44	Dakshin Dinajpur	31.35	2
3	Dakshin Dinajpur	31.41	Nadia	30.53	3
4	Hoogly	31.07	Cooch Behar	30.43	4
5	Nadia	30.88	Hoogly	30.31	5
6	Howrah	30.85	Jalpaiguri	30.15	6
7	North 24 Parganas	30.53	Darjeeling	29.76	7
8	Jalpaiguri	29.79	Bankura	29.57	8
9	Darjeeling	28.85	Malda	29.39	9
10	Murshidabad	28.46	North 24 Parganas	29.36	10
11	Burdwan	28.08	Uttar Dinajpur	29.34	11
12	Uttar Dinajpur	27.41	Howrah	28.67	12
13	Maldah	26.35	Murshidabad	28.51	13
14	Birbhum	26.06	Burdwan	27.59	14
15	Pashchim Medinipur	25.54	Birbhum	27.58	15
16	Bankura	25.48	Midnapore	17	16
17	South 24 Parganas	24.55	Purulia	25.45	17
18	Purba Medinipur	22.12	South 24 Parganas	24.3	18
19	Purulia	20.93			
	West Bengal	28.14	West Bengal	28.72	

Source: Primary Census Abstract;2011

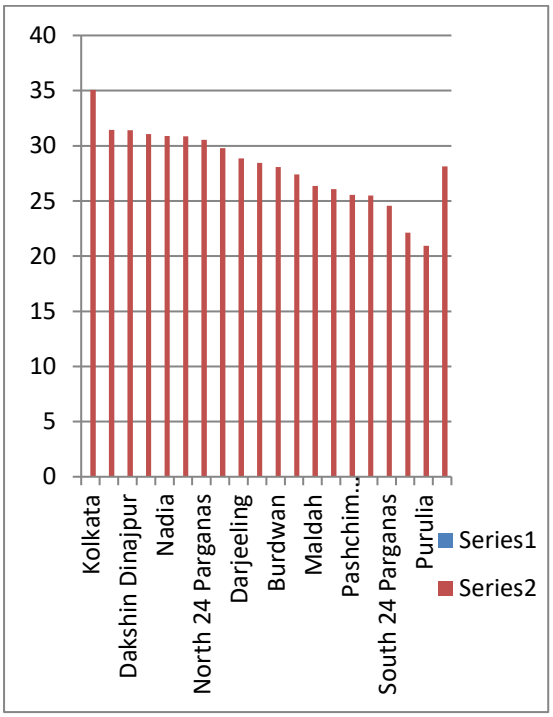


Figure (1)

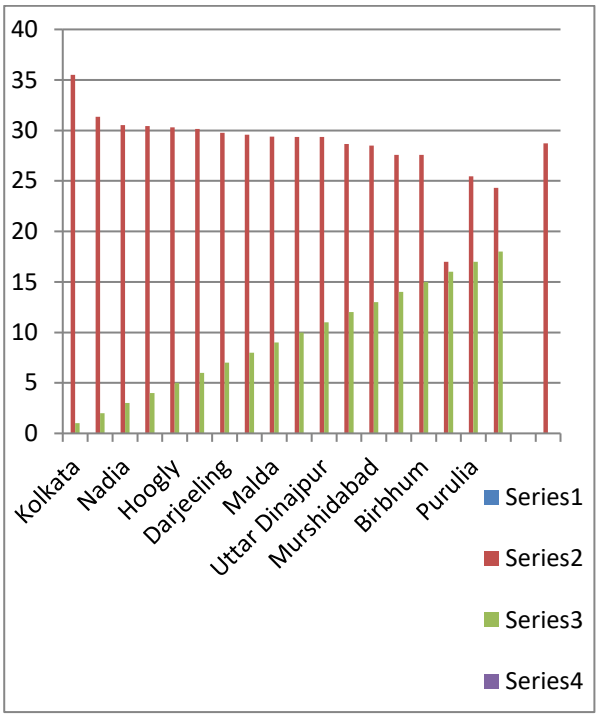


Figure (2)

The above table (1) and the respective bar diagrams showing the deference of work participation rate between the years 2011 and 2001 respectively. It can be seen that work participation rate of Kolkata, Jalpaiguri, Darjeeling, Murshidabad, Uttar Dinajpur, Malda, Bankura & Purulia in 2011 is lesser than that of 2001. Similarly, the work participation rate of Cooch Behar, Dakshin Dinajpur, Hoogly, Nadia, Howrah, North 24 Parganas, Burdwan, Birbhum, Medinipur & South 24 Parganas in 2011 is greater than that of 2001.

The mean of work participation rate of 2011 is 28.15 and the work participation rate of 2001 is 28.6. So, the mean of 2001 is greater than the mean of 2011, so we can see a falling tendency of the mean. Standard error of 2011 and 2001 are 0.81 and 0.87. Median of 2011 is 28.46 and of 2001 is 29.375. Standard deviation of 2011 and 2001 are 3.54 and 3.73. Kurtosis of 2011 and 2001 are -0.0624 and 5.43. Skewness of work participation rate of 2011 and 2001 are -0.297 and -1.651.

Table-2. District wise Population by Sex in West Bengal, Census 2011

District	Area in Sq.Km.(P)	Population				
		Male	Female	Total	Rural	Urban
West Bengal	88752	46809027	44467088	91276115	62183113	29093002

Burdwan	7024	3966889	3750674	7717563	4639264	3078299
Birbhum	4545	1790920	1711484	3502404	3052956	449448
Bankura	6882	1838095	1758579	3596674	3296901	299773
Purba Medinipur	4713	2629834	2466041	5095875	4503161	592714
Paschim Medinipur	9368	3007885	2905572	5913457	5190771	722686
Hoogly	3149	2814653	2704492	5519145	3390646	2128499
Purulia	6259	1496996	1433119	2930115	2556801	373314
North 24 Parganas	4094	5119389	4890392	10009781	4277619	5732162
South 24 Parganas	9960	4173778	3988183	8161961	6074188	2087773
Kolkata	185	2356766	2139928	4496694	-	4496694
Howrah	1467	2500819	2349210	4850029	1775885	3074144
Nadia	3927	2653768	2513832	5167600	3728727	1438873
Murshidabad	5324	3627564	3476243	7103807	5703115	1400692
Uttar Dinajpur	3140	1551066	1456068	3007134	2644906	362228
Dakshin Dinajpur	2219	857199	819077	1676276	1439981	236295
Malda	3733	2051541	1937304	3988845	3447185	541660
Jalpaiguri	6227	1983064	1889782	3872846	2812495	1060351
Darjeeling	3149	937259	909564	1846823	1118860	727963
Cooch Behar	3387	1451542	136754	2819086	2529652	289434

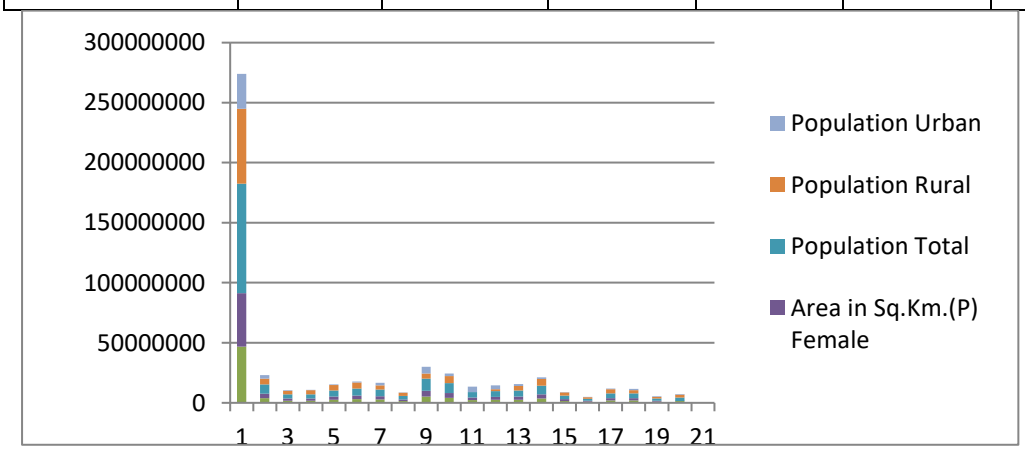


Figure (3)

Source: Primary Census Abstract

The above diagram (2) represented the district wise population by sex in West Bengal of 2011. Here the population of urban areas is thicker than the population of the rural areas. Again the population of male is greater than the population of the female.

The mean of the male population is 2463633 and the mean of the female population is 2275594.632. So, the mean of female population is lesser than that of the male, so this is not satisfying result for female. For calculating the Standard Error we can see that for male is 259524.425 and for female 269706.0634, here the Standard Error of female population is higher than the male population. Median of male and female are 2356766 and 2139928 respectively. Median of male population is higher than that of the female. Standard deviation for male population is 1131240.742 and for female 1175621.475. So SD of female population is little higher than the male population. Skewness of male and female population is 0.76 and 0.43. As we can see there is a little difference in between them. Kurtosis of male is 0.24 and female is 0.18; kurtosis of male is higher than the female.

Table-3. Population ,Literacy rate by Sex and Density ,Decennial Growth rate in West Bengal by District(Census 2011)

District	Population				Literacy rate (%) (Excluding 0-6 Population)		
	Male	Female	Total	Decennial growth rate(%) of (2001-11)	Male	Female	Total
West Bengal	46809027	44467088	91276115	13.84	81.69	70.54	76.26
Burdwan	3966889	3750674	7717563	11.92	82.42	69.63	76.21
Birbhum	1790920	1711484	3502404	16.15	76.92	64.14	70.68
Bankura	1838095	1758579	3596674	12.65	80.05	60.05	70.26
Purba	262983	246604	509587	15.36	92.32	81.37	87.02

Medinipur	4	1	5				
Paschim Medinipur	3007885	2905572	5913457	13.86	85.26	70.5	78
Hoogly	2814653	2704492	5519145	9.46	87.03	76.36	81.8
Purulia	1496996	1433119	2930115	15.52	77.86	50.52	64.48
North 24 Parganas	5119389	4890392	10009781	12.04	87.61	80.34	84.06
South 24 Parganas	4173778	3988183	8161961	18.17	83.35	71.4	77.51
Kolkata	2356766	2139928	4496694	-1.67	88.34	84.06	86.31
Howrah	2500819	2349210	4850029	13.5	86.95	79.43	83.31
Nadia	2653768	2513832	5167600	12.22	78.75	70.98	74.97
Murshidabad	3627564	3476243	7103807	21.09	69.95	63.09	66.56
Uttar Dinajpur	1551066	1456068	3007134	23.15	65.52	52.17	59.07
Dakshin Dinajpur	857199	819077	1676276	11.52	78.37	67.01	72.82
Malda	2051541	1937304	3988845	21.22	66.24	56.96	61.73
Jalpaiguri	1983064	1889782	3872846	13.87	79.95	66.23	73.25
Darjeeling	937259	909564	1846823	14.77	85.61	73.33	79.56
Cooch Behar	1451542	1367544	2819086	13.71	80.71	68.49	74.78

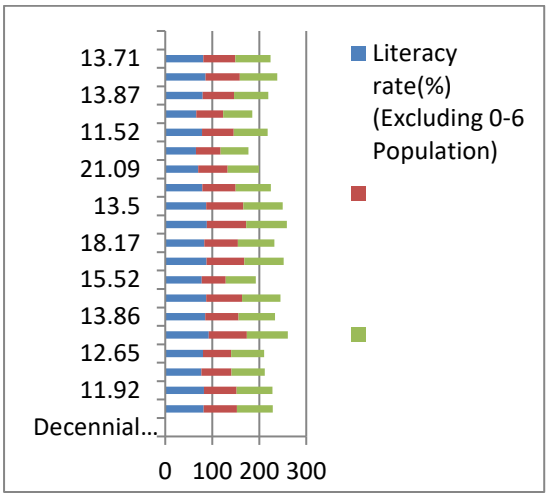


Figure (4)

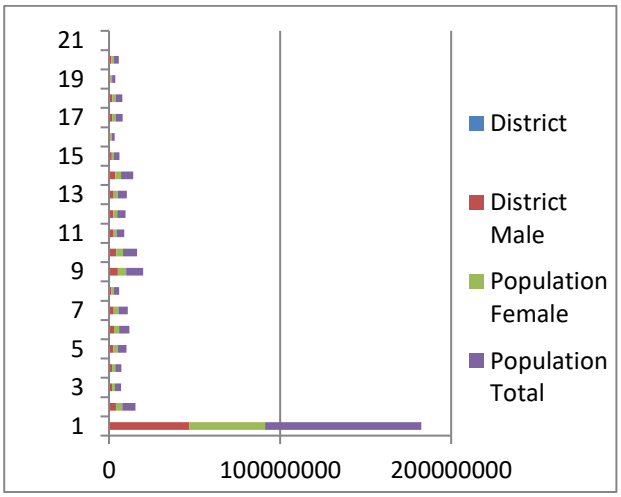


Figure (5)

In this above bar diagram (3) we can see that the population, literacy rate by sex and density, decennial growth rate are plotted respectively. Here the population of male is also greater than the female. Literacy rate is also higher for the male population than female population.

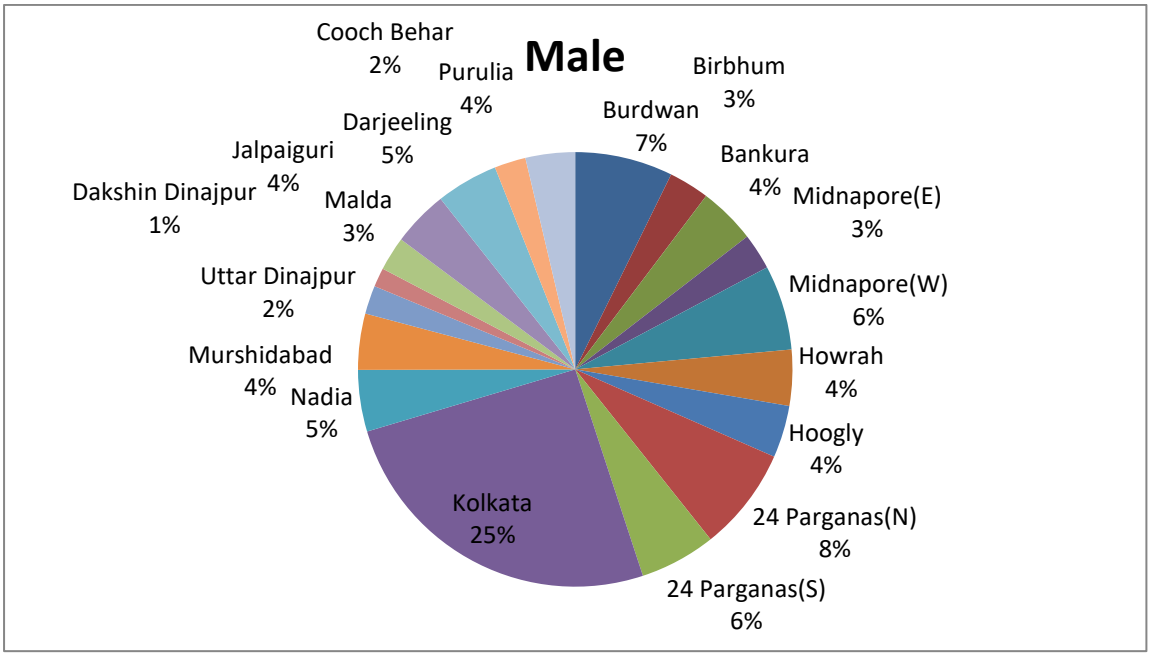
The mean of the male population is 2463633 and of the female population 2340373.053. So the overall mean of the male is greater than that of the female. Standard error of male population=259524.425 and of female= 248078.7781. Median of male and female population is 2356766 and 2139928. So the median of male population is greater than that of the female. Standard deviation of male and female population is 1131240.742 and 1081350.324. Skewness of male and female population is 0.76 and 0.79. Kurtosis of male population is 0.24 and for female population= 0.26.

Table-4. Distribution of Employees in Government of West Bengal by District of Posting and as on 31.03.13

District	Male	Female	Total
Burdwan	20876	4693	25569
Birbhum	8632	2297	10929
Bankura	12162	3029	15191
Midnapore(E)	7718	2211	9929
Midnapore(W)	18111	4044	22155
Howrah	11931	2811	14742
Hoogly	11140	3524	14664
24 Parganas(N)	22109	4246	26355
24 Parganas(S)	16231	4206	20437
Kolkata	72904	14510	87414

Nadia	13134	3704	16838
Murshidabad	11974	3168	15142
Uttar Dinajpur	6062	1394	7456
Dakshin Dinajpur	4052	1245	5297
Malda	7270	1935	9205
Jalpaiguri	11931	2528	14459
Darjeeling	13238	4051	17289
Cooch Behar	6688	1896	8584
Purulia	10579	1998	12577
West Bengal	286742	67490	354232

Source: Bureau of Applied Economics and Statistics, Government of West Bengal



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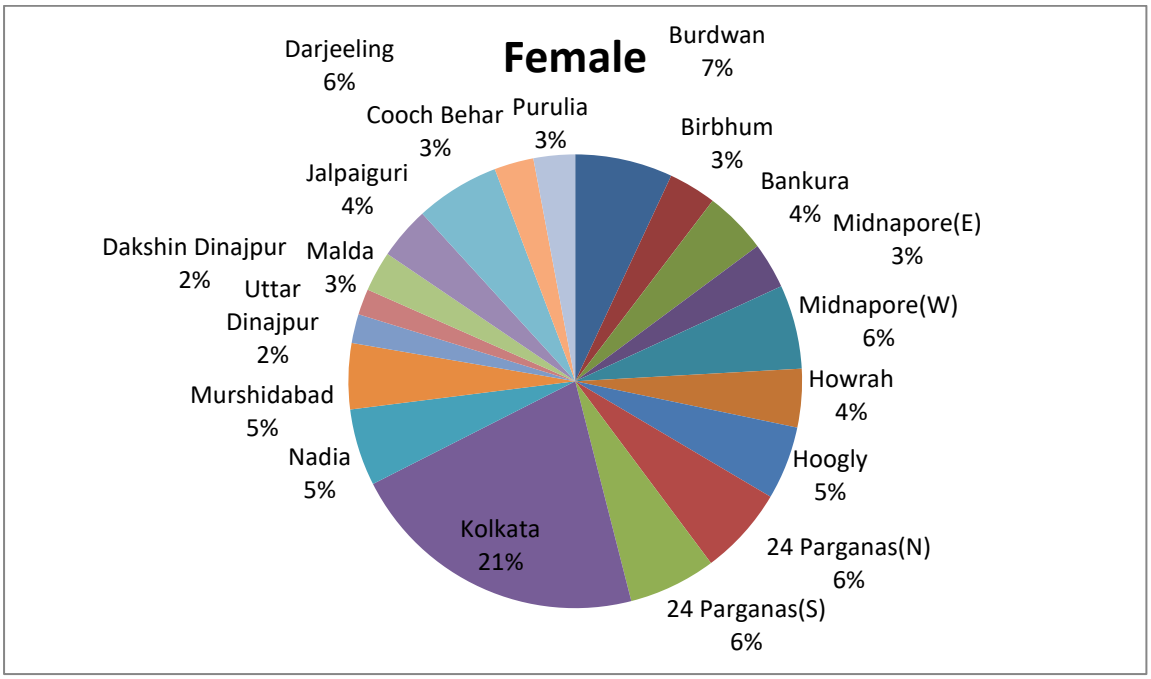

Figure (7)

In this two pie diagrams we can see that, the distribution of employees of different districts. And it is very clear that there is a huge employment gap between the male and female employees in every districts of West Bengal.

The mean of the male employees is 15091.68 and of female employees 3552.105, here we can see that the mean of male workers is really high than of the female workers. Standard error of the male and female employees is 3397.72 and 6533.26. The calculation of median for male workers is 11931 and female workers is 3029, so it is too small than the median of male workers. Kurtosis of male workers is 14.51 and female workers is 13.54. For male employees the Skewness is 3.62 and for female 3.43.

Table-5. District wise Unemployment rate in West Bengal under activity status by residence during 2009-10(Per 1000 persons)

Districts	Rural	Urban	Combined
Darjeeling	92	43	77
Jalpaiguri	31	78	37
Cooch Behar	12	29	12
Uttar Dinajpur	18	51	21
Dakshin Dinajpur	0	35	3

Malda	8	31	11
Murshidabad	15	49	17
Birbhum	36	87	39
Bardhaman	17	54	28
Nadia	12	30	16
North 24 Parganas	22	48	34
Hoogly	13	6	37
Bankura	2	27	5
Purulia	4	56	9
Paschim Medinipur	7	36	12
Howrah	19	35	26
Kolkata	-	34	34
South 24 Parganas	8	34	11
Purba Medinipore	22	49	24
West Bengal	15	42	23

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

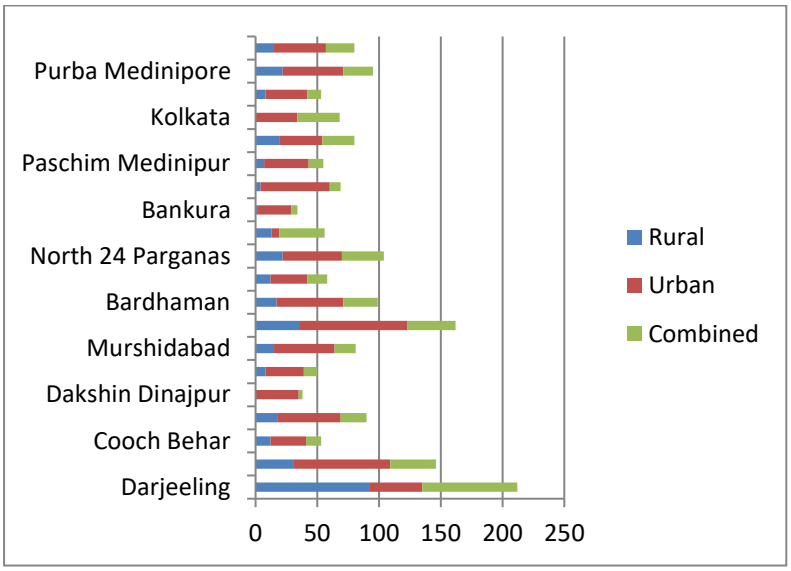

Figure (8)

In this bar diagram we can see that, the unemployment rate of rural area of Darjeeling and Hoogly are more than the unemployment rate of urban area. Except that the unemployment rate of the other districts are higher in urban areas than the rural areas.

The mean of the unemployed male workers is 17.79 and of the female workers is 42.74, so the mean of male workers is higher than the female workers. Standard error of male workers is 4.69 and of female workers is 4.22. Median is 13 for the male workers and 36 for the female workers, so here the median of female workers is higher than that of the male. Kurtosis of male is 10.09 and for female 1.47. Skewness of male workers is 2.87 and of female workers is 0.73, so it is less than the male workers.

Table-6. District wise non-worker population by sex.

State/District	Total Rural Urban	Non Worker (Number)			Non Worker as a percentage to respective total population		
		Person	Male	Female	Person	Male	Female
1	2	27	28	29	30	31	32
India	T	626375604	257142296	36923308	60.89	24.99	35.89
	R	432534569	18276321	249771048	42.05	17.76	24.28
	U	193841035	74378775	119462260	18.84	7.23	11.61
West Bengal	T	50694507	19077941	31616566	63.23	46.01	81.68
	R	35859304	13596128	22263176	62.1	45.91	79.14
	U	14835203	5481813	9353390	66.15	46.26	88.43
Burdwan	R	2661783	973858	1687925	61.21	43.49	80.02
	U	1782490	693574	1088916	69.98	51.41	90.91
Birbhum	R	1712554	642915	1069639	62.12	45.46	79.65
	U	174371	63844	110527	67.48	48.17	87.8

Bankura	R	1609502	650950	958552	54.42	42.95	66.47
	U	155921	56616	99305	66.28	46.96	86.58
Midnapore	R	5180967	1985541	3195426	60.06	45.04	75.74
	U	678764	251258	427506	68.99	49.42	89.92
Howrah	R	1412773	481882	930891	66.61	44.48	89.71
	U	1421452	507883	913569	66.05	43.84	91.95
Hoogly	R	2059868	718246	1341622	61.41	42.25	81.09
	U	1122621	408169	714452	66.52	45.87	89.54
Purulia	R	1226819	548238	678581	53.78	47.06	60.8
	U	182209	70818	111391	71.34	53.24	91
Nadia	R	2365439	839310	1526129	65.25	4494	86.83
	U	623683	226784	396899	63.67	45.43	82.63
Murshidabad	R	3415288	1283287	2132001	66.53	48.77	85.26
	U	4415288	185044	261063	60.88	49.77	72.33
Uttar Dinajpur	R	1305368	528655	776713	60.79	47.88	74.46
	U	200902	77405	123497	68.23	49.77	88.89
Dakshin Dinajpur	R	755964	290364	465600	57.87	43.35	73.15
	U	134486	51499	82987	68.32	51.22	86.16
Malda	R	1785283	740708	1044575	58.54	47.31	70.4
	U	164479	60871	103608	68.27	49.19	88.41
Jalpaiguri	R	1688002	686390	1001612	60.41	47.76	73.8
	U	410035	149355	260680	67.56	47.57	89
Darjeeling	R	685501	289897	395604	62.96	52.08	74.35
	U	354229	137777	216452	68.06	50.28	87.84
Cooch Behar	R	1360226	519182	841044	60.36	44.86	76.72
	U	152224	54362	97862	67.47	47.33	88.35
North 24 Parganas	R	2709400	965558	1743842	66.35	45.93	88.02
	U	3236726	1171706	2065020	66.72	46.19	89.22
South 24	R	3924567	1451147	2473420	67.43	48.42	87.61

Parganas							
	U	739362	266356	473006	68.07	46.92	91.23
Kolkata	R	-	-	-	-	-	-
	U	2855142	1048492	1806650	62.44	41.94	87.16

Sources: Primary Census Abstract, West Bengal, Series 20 ,Volume 1 ,Census of India,2001.(1) Statistical Abstract ,Central Statistical Organisation .(2)

Above table represents the inter-district unemployment in West Bengal. It is clear that most of the districts non-workers are of rural areas. Here also we can see the percentage of non-workers for female is higher than the percentage of male. Same scenario can be seen for the percentage of non-workers of male and female all over the country.

- Regression Analysis :

Table-7(a): Here, we have shown the inter-district work participation rate on population and sex ratio. These data is collected from census, 2011.

District	Work Participation Rate	Population by area in Sq.Km.	Sex Ratio
Kolkata	35.06	185	86.31
Cooch Behar	31.44	3387	74.78
Dakshin Dinajpur	31.41	2219	72.82
Hoogly	31.07	3149	81.8
Nadia	30.88	3927	74.97
Howrah	30.85	1467	83.31
North 24 Parganas	30.53	4094	84.06
Jalpaiguri	29.79	6227	73.25
Darjeeling	28.85	3149	79.56
Murshidabad	28.46	5324	66.56
Burdwan	28.08	7024	76.21
Uttar Dinajpur	27.41	3140	59.07
Maldah	26.35	3733	61.73
Birbhum	26.06	4545	70.68
Pashchim Medinipur	25.54	9368	78
Bankura	25.48	6882	70.26
South 24 Parganas	24.55	9960	77.51

Purba Medinipur	22.12	4713	87.02
Purulia	20.93	6259	64.48

Source: Primary Census Abstract, 2011

In determining the relation, the study fits a multiple linear regression model where the inter-district work participation rate is the explained variable and is regressed upon the population and sex which is the explained variable. The model's specification is as follows:

$$Y_i = b_0+b_1X_{1i}+b_2X_{2i}+\epsilon_i \quad \text{---------- (1)}$$

Where, i = 1, 2, 3,……., 19;

Y_i = Work participation rate i.e. the dependent/explained variable. X_1, X_2 = Population and sex ratio are the independent/explanatory variables. Here ϵ_i is the stochastic disturbance term; b_0, b_1, b_2 are unknown parameters.

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

$$\hat{Y}_i = \hat{b}_0+\hat{b}_1X_{1i}+\hat{b}_2X_{2i} \quad \text{---------} \quad (2)$$

$\hat{b}_0$, $\hat{b}_1$ and $\hat{b}_2$ are the numerical estimate of b_0, b_1, and b_2,

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

And therefore obtain the estimated residual $e_i = \epsilon_i$,

$$e_i = Y_i - \hat{Y}_i = \hat{Y}_i - \hat{b}_0 - \hat{b}_1X_{1i} - \hat{b}_2X_{2i} \quad \text{----------} \quad (3)$$

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

$t^* = \hat{\beta}/SE(\hat{\beta})$ (under $H_0: b_1$, $H_0: b_2 = 0$)

Where, $SE(\hat{\beta})$ is the standard error of $\hat{b}_1$ and $\hat{b}_2$.

Here, we have used the two tailed t-test of 5%, there are 19 districts in the table, so our observation= 19. Thus the degrees of freedom = 16. The value of t statistics from the regression analysis of intercept X1= -3.36, where the degrees of freedom is 16 and the table value is 2.120, thus -4.03 is lesser than 2.120. This means that the null hypothesis cannot be rejected, so the regression analysis for X1 is insignificant. Now it is clear that the relation between the work participation and the population of each district is insignificant. So, we can also say that there is an insignificant relationship between the independent variable X1 and the dependent variable Y.

The value of t statistics from the regression analysis of intercept X2=1.3, where the degrees of freedom = 16 and the table value is 2.120, thus 1.3 is lesser than 2.120, this means we cannot reject

the null hypothesis, so the regression analysis for X2 is insignificant. Now we can say that the relation between the work participation and the sex of each district is insignificant and we can also know about the insignificant relationship between the independent variable X2 and the dependent variable Y.

So, we can see an inarticulate decision of the tests. For t-test the relationship between the work participation and population or work participation and sex both are insignificant.

Table-7(b): Here we have shown district-wise unemployment rate on population and sex ratio. This data is collected from census, 2010-11.

Districts	Unemployment rate	Population	Sex
Darjeeling	77	3149	79.56
Jalpaiguri	37	6227	73.25
Cooch Behar	12	3387	74.78
Uttar Dinajpur	21	3140	59.07
Dakshin Dinajpur	3	2219	72.82
Malda	11	3733	61.73
Murshidabad	17	5324	66.56
Birbhum	39	4545	70.68
Bardhaman	28	7024	76.21
Nadia	16	3927	74.97
North 24 Parganas	34	4094	84.06
Hoogly	37	3149	81.8
Bankura	5	6882	70.23
Purulia	9	6259	64.48
Paschim Medinipur	12	9368	78
Howrah	26	1467	83.31
Kolkata	34	185	86.31
South 24 Parganas	11	9960	77.51

Purba Medinipore	24	4713	87.02

Source: Primary Census Abstract, 2010-11

In determining the relation, the study fits a multiple linear regression model where the number of inter-district unemployed persons is dependent variable and is regressed upon the total number of unemployed male and female which are the independent variable. The model's specification is as follows:

$$Y_i = b_0+b_1X_{1i}+b_2X_{2i}+\epsilon_i \quad \text{---------- (1)}$$

Where, i = 1, 2, 3,……., 19;

Y_i = the number of persons unemployed i.e. the dependent/explained variable. X_1, X_2 = the number of male and female unemployed workers i.e. the independent/explanatory variables. Here ϵ_i is the stochastic disturbance term; b_0, b_1, b_2 are unknown parameters.

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

$$\hat{Y}_i = \hat{b}_0+\hat{b}_1X_{1i}+\hat{b}_2X_{2i} \quad \text{---------} \quad (2)$$

$\hat{b}_0$, $\hat{b}_1$ and $\hat{b}_2$ are the numerical estimate of b_0, b_1, and b_2,

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

And therefore obtain the estimated residual $e_i = \epsilon_i$,

$$e_i = Y_i - \hat{Y}_i = \hat{Y}_i - \hat{b}_0 - \hat{b}_1X_{1i} - \hat{b}_2X_{2i} \quad \text{----------} \quad (3)$$

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

$t^* = \hat{\beta}/SE(\hat{\beta})$ (under $H_0: b_1$, $H_0: b_2 = 0$)

Where, $SE(\hat{\beta})$ is the standard error of $\hat{b}_1$ and $\hat{b}_2$.

Here, we have used the two tailed t-test of 5%, there are 19 districts in the table, so our observation= 19. Thus the degrees of freedom = 16. The value of t statistics from the regression analysis of intercept X1= -1.08, where the degrees of freedom is 16 and the table value is 2.120, thus -1.29 is lesser than 2.120. This means that the null hypothesis cannot be rejected, so the regression analysis for X1 is insignificant. Now it is clear that the relation between the unemployment rate and the sex ratio of each district is insignificant. So, we can also say that there is a insignificant relationship between the independent variable X1 and the dependent variable Y.

The value of t statistics from the regression analysis of intercept X2=1.5, where the degrees of freedom = 16 and the table value is 2.120, thus 1.5 is lesser than the table value that is 2.120, this means that we fail to reject the null hypothesis. The regression analysis for X2 is insignificant. Now we can say that the relation between the unemployment rate and the sex ratio of each district is insignificant and we can also know about the insignificant relationship between the independent variable X2 and the dependent variable Y.

So, we can say that the relation between unemployment rate and population or unemployment rate and sex both are insignificant, as in the t-test.

We can see that Work Participation or Unemployment does not affect the population and the sex ratio; it happened may be because of the lower number of the power of test. Here we have only 19 observations. If the number of observation increases then this result may change.

7. POLICY SUGGESTION

In this section we will discuss about some of the policies which can be used as a tool of employment and economic development in the districts of West Bengal.

Policies must be taken to create employment opportunities for the young group of people in West Bengal. Productivity in agricultural sector should be implemented. Some policies must be taken to remove seasonal unemployment, which are mainly found in agricultural sector and agro-based based industries. In this sector the agricultural area should have multiple cropping like horticulture, dairying, plantations and animal husbandry should be encouraged and cottage industries should be encouraged. Labour-intensive technology should be taken in the place of capital-intensive technology.

Government should take necessary steps to encourage the industries in co-operative sector to help the self-employed people financially by providing raw materials and technical training. Family planning programme should be implemented widely and effectively. It will minimize the growth of population. Appropriate policies should be taken to reduce population as it creates economic problem like rise in inflation, company's threats etc. In addition to economic growth, economic freedom, labour market reforms a high share of part time employment, and active labour market policies should be taken to reduce unemployment and to improve labour market performance.

We have not taken all the factors into account. We have only taken two factors i.e. population and sex ratio which are the stepping stone variables. Both of the two variables have shown insignificant

results. In our future researches we will work with the factors which we have not taken into account in this research.

8. CONCLUSION

In recent years the rate of unemployment in West Bengal is very high. The main reason behind it is the less job opportunities and less work participation rate. As West Bengal is a highly populated state, the increase in population results in the higher supply of labour force. The demand of labour is lesser than the supply of labour because of the capital-intensive tendency. Increasing employment opportunities between male and female and controlled population growth decreases the unemployment and similarly increases the work participation rate. Unless the job opportunities are improved immediately, economic development cannot be achieved in West Bengal. This is the only possible way to recover from this kind of unemployed situation.

From this preceding regression analysis, we can see that population and sex ratio does not affect work participation rate and unemployment. This result is because of the power of test is very low for this regression analysis as we have worked on only 19 observations for this model. In case we got more observations, this result may have changed.

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