IMPACT OF COVID – 19 LOCKDOWN ON UNEMPLOYMENT IN INDIA – A BEFORE, DURING AND AFTER ANALYSIS

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ABSTRACT

Purpose of the research paper is to assess the impact of COVID – 19 lockdown on the unemployment rate in India.

Design / Methodology / Approach: The data on unemployment rate is collected from CMIE database and the data set is divided into three phases i.e. Before Lockdown, During Lockdown and After Lockdown. Kruskal - Wallis K Samples test is applied to this data set. A Post-hoc analysis with Mann – Whitney U test is also conducted by taking two phases at a time to locate the phase from which the statistically significant difference is emanating in unemployment rate.

Findings: The results of this study indicate that there is a significant difference between before and after lockdown phases in case of total unemployment rate. Similar findings are found in case of rural unemployment rate also. Interestingly, in case of urban unemployment rate, it is found that there is no significant difference between before and after lockdown phases. It means that COVID-19 lockdown has not affected the unemployment rate in urban areas.

Research Limitations and Implications: The study is based on the total, rural, and urban unemployment rates that are measured in terms of monthly %. However, if the data is taken in terms of quarterly, half yearly and on annual basis, the results may differ. The future researchers may collect the unemployment data state-wise or sector-wise and trace out the state or sector that is affected heavily by lockdown.

Originality: In this research paper, the authors have used Kruskal Wallis K samples test and Mann Whitney U test to the real time data collected from Centre for Monitoring Indian Economy (CMIE) database and the findings are in tune with the original data and reflect the current situation in India.

KeyWords: Lockdown, Unemployment, India, Kruskal – Wallis Test, Mann – Whitney Test.

INTRODUCTION

COVID – 19 stands for Corona Virus Disease of 2019. Corona Viruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more severe diseases such as Middle East respiratory syndrome (MERS)-CoV and Severe Acute Respiratory Syndrome (SARS)-CoV. On December 31, 2019, China informed the World Health Organization (WHO) about cases of pneumonia of unknown aetiology detected in Wuhan city, Hubei province of China. The WHO Director-General on January 30, 2020, declared COVID-19 outbreak as Public Health Emergency of International Concern (M.A.

Andrews et al, 2020). IMF projected that the cumulative loss to global GDP over 2020 and 2021 due to COVID – 19 would be around 9 trillion dollars, greater than the economies of Japan and Germany, combined. UN estimated that COVID-19 pushed global unemployment over 200 million mark in 2022.

In case of India, the first case of COVID – 19 infection was reported on January 27, 2020, a 20 yr old female who returned to Kerala from Wuhan city, China. In order to control the COVID – 19 outbreak, the Indian government has announced the lockdown for 21 days from 24.03.2020. India faced second wave of COVID – 19 also that has resulted in another lockdown.   India's GDP reported –24.4% declining in second quarter of 2020 alone. The months of the lockdown resulted in the free fall of employment in many sectors. The Government of India has announced a relief package of almost INR 1.7 trillion to handle this situation. In April 2020, the International Labour Organisation (ILO) estimated that more than 40 crore informal workers in India may get pushed into deeper poverty due to the pandemic. In this context, this research paper attempts to evaluate the impact of COVID–19 lockdown on unemployment rate in India.

REVIEW OF LITERATURE

Vyas, (2020) in his research article observed that the impact of COVID–19 lockdown on Indian economy was devastating. The index of 8-core industries fell by 38.6% in April 2020. Three months later in June 2020, the index was still 15% lower than it was a year ago. He recommended to use the database of CMIE's Consumer Pyramids Household Survey (CPHS) which is started collecting the data in January 2014 and has continued uninterrupted since then. This is a longitudinal panel household survey with a total sample size of 174,405 households.

Deshpande, (2020) in her research article has compared the hours spent on domestic work pre-and post-lockdown. She found that the amount of time spent on housework increased post-lockdown for both men and women. Middle-class Indians are heavily dependent on paid domestic helpers. Barring a small proportion of live-in helpers, most of these helpers could not show up for work, which implied that the domestic work burden of middle-class employers of household help increased. However, it is noteworthy that the gender gap in average hours spent on domestic work hours decreased in the first month of the lockdown. She recommended to frame strong policies to provide employment and boost demand in order to sustain the momentum in employment generation in the months to come.

Kandoussi & Langot (2020) have developed a multi-sectoral matching model to predict the impact of the lockdown on the US unemployment, considering the heterogeneity of workers to account for the contrasted impacts across various types of jobs. The authors proved that separations and business closures that hit the workers with the first level of education have explained the abruptness of the unemployment rise. The existence of significant congestion externalities in the hiring process suggests that a comeback to the pre-crisis unemployment level could be reached in 2024 in a scenario with a double wave. In the same scenario, a calibration on French data leads to more pessimistic forecasts with a comeback to the pre-crisis unemployment level expected until 2027.

Singh (2020) offered insights on the plight of migrant labourers and impact of COVID-19 on rural economy in India. The major finding of the study suggests 400 million workers in India in the informal economy are at the risk of falling deeper into poverty during the crisis. The low reporting of COVID-19 cases due to low testing will result in community spread. The reverse migration will create excess pressure on the agriculture and rural

economy which will result in a significant number of people to fall into abject poverty. COVID-19 will have both short and long-run effect on the rural economy in India. He opined that the government's economic package has only long-term measures. He recommended to provide the short-term measures such as cash incentive and waging subsidy to save migrant labour and marginal farmers.

Deori & Konwar (2020) in their research paper titled *"Impact of COVID-19 in North Eastern States of India"* found that prolonged lockdown created many difficulties and challenges in the entire Northeast India. About 12.2 Crore people in India including Northeast lost their jobs in the month of April 2020. There have been huge lose in the tea Industry, tourism Industry, agriculture and rural economy etc. Lockdown has also led to technological reform in the Northeast states. It has significantly improved people's efficiency towards the use of technology.

Joshi, et al. (2020) made an attempt to ascertain the impact of lockdown on the Indian economy and explore future perspective. The study has addressed important issues like consumption expenditure, demand & supply, unemployment rate, purchasing power, financial market, etc. Under the given circumstances, the lockdown is estimated to cost India around USD 120 bn. The manufacturing and service sector have come to an abrupt stop and interrupted domestic supply chains. The study made recommendations to minimize negative effect of lockdown.

Gulati, et al (2021) in their research examined the impact of the COVID-19 pandemic and the related nationwide lockdown on the Indian economy, particularly on food systems. The researchers addressed the issue of millions of migrant workers in India who have suffered the most during this period. At the end, the study has made recommendations on how to broaden the support for migrant workers nationwide.

Graham, & Ozbilgin (2021) have developed a model that describes the macroeconomic and distributional consequences of lockdown shocks during the COVID-19 pandemic. The model features heterogeneous life-cycle households, labour market search and matching frictions, and multiple industries of employment. The authors have calibrated the model to data from New Zealand, where the health effects of the pandemic were especially mild. They modelled lockdowns as supply shocks, ignoring the demand shocks associated with health concerns about the virus. Then, they studied the impact of a large-scale wage subsidy scheme implemented during the lockdown. The policy prevents job losses equivalent to 6.5% of steady state employment. Moreover, they found significant heterogeneity in its impact.

Arora, et al (2021) analyzed the impact of the pandemic on the tourism industry at Nainital – a tourist spot in India in both the stages i.e. during lockdown and unlock/ partial lockdown. A SWOC (Strengths, Weaknesses, and Opportunities & Challenges) analysis was performed as an effective warfare mechanism against the ubiquitous unpleasant situation. It was de-coded that the surging conditions precipitated from certain psychological and behavioural impediments of all the three components viz. Government, Public and Covid-19 virus, which were essentially required to be mapped.

Ahmad, et al (2023) have undertaken the research with an intention to examine the impact of COVID – 19 on the unemployment rate and to develop a model for accurate prediction of unemployment rate. They found that classical time series models such as ARIMA models and advanced non- linear time series methods are commonly used for unemployment rate prediction. However, mostly these data sets are non- linear as well as

non- stationary. Consequently, a random error can be produced by a distinct time series prediction model. They considered hybrid prediction approaches supported by linear and non- linear models to forecast the unemployment rates much precisely. These hybrid approaches of the unemployment rate can advance their estimates by reproducing the unemployment ratio irregularity. These models' appliance is exposed to six unemployment rate data from Europe's selected countries, specifically France, Spain, Belgium, Turkey, Italy and Germany. Among these hybrid models, the hybrid ARIMA- ARNN forecasting model performed well for France, Belgium, Turkey and Germany, whereas hybrid ARIMA- SVM performed outclass for Spain and Italy. Furthermore, these models are used for the best future prediction. The results of these models show that the unemployment rate will be higher in the coming years due to COVID – 19, and it will take at least 5 years to overcome the impact of COVID- 19 in these countries.

Chauhan, P. (2021) conducted a study with an objective of examining the impact of COVID – 19 pandemic on women's burden of unpaid works in India. He has done a comparative analysis of the gender differences in time spent on unpaid work before and during the lockdown, and analyzed the reasons for the same. He found that the pandemic has exacerbated the already existing gender inequalities with substantial implications on women. With the closure of offices and educational institutions, and the emerging norm of work from home and online education, along with the lack of services of domestic worker, the need to perform unpaid chores in the household has increased.

Roychowdhury, A et al (2022) in their research article examined the impact of nationwide lockdown on the Indian labour market, restricted to the first wave of the Covid-19 pandemic. As a result of lockdown, both labour supply and labour demand contracted sharply; moreover, they found the evidence of discouraged worker effect. An analysis of the demand side of the labour market showed an unequal impact of lockdown on different segments (region, gender, and caste) of the workforce. They also found a marked deterioration in the quality of employment and wages / income. They opined that the policy response of the Union government was inadequate and far from satisfactory; as a result, labour market recovery was uneven and stunted.

Sharyu Gandhi et al (2022) have undertaken the research with an aim to delineate the impact of COVID-19 on unemployment in India. They noted that there has been a slowdown in the growth of employment in India despite the boost in the economic sector in the recent past. At the time of COVID–19 lockdown, there had been a devastating effect on the unemployment rate in India as most of the private companies have fired their employees. The main sufferers of this lockdown are the informal sector employees as the majority of them started losing jobs since construction works were closed.

Shameem, & Rajeswari, (2022) have attempted to analyze the impact of the Covid-19 pandemic on unemployment in India, considering the secondary data collected through websites, newspapers, journals, and reports. They found that India was experiencing unemployment crisis from a long period and Covid-19 pandemic lockdown has added to the woes of it.

Ghatak, & Sarkar, (2022) have done an extensive research on the impact of COVID-19 pandemic on the employment of domestic workers in the cities. After three months of lockdown in India the job-insecurity is further intensified both in terms of availability and securing deserving wages. They have collected the data through interviews over the phone and canvassing the Google forms among workers, NGOs and employers in Ahmedabad and

Kolkata cities of India. The research paper argued that middle class insecurities among employers intensify the struggle for the domestic workers going beyond the mortality and morbidity risks associated with COVID-19 pandemic. With a few exceptions the results imply deterioration in terms of employment and employer-employee relationship.

METHODOLOGY AND DATA SET

Research Questions: This paper attempts to seek answers to the following research questions.

1. Is there any significant difference in the unemployment rates between before and during COVID - 19 lockdown phases in India in terms of total, rural and urban unemployment rates?
2. Is there any significant difference in the unemployment rates between during and after COVID -19 lockdown phases in India in terms of total, rural and urban unemployment rates?
3. Is there any significant difference in the unemployment rates between before and after COVID -19 lockdown phases in India in terms of total, rural and urban unemployment rates?

Research Objectives: This research paper aims to achieve the following research objectives.

1. To evaluate the performance of various ESG funds offered by SBI funds management Ltd.
2. To identify the category of ESG funds vis-à-vis their counterparts that provides better returns to the investors.

Research Hypotheses: The null hypotheses that will be tested in this research paper are given below**.**
The null hypotheses that will be tested in this research paper are given below**.**

- *Hypothesis – 1 (H_{01}): There is no significant difference in the total unemployment rate in India among before, during and after lockdown phases.*

- *Hypothesis – 2 (H_{02}): There is no significant difference in the rural unemployment rate in India among before, during and after lockdown phases.*

- *Hypothesis – 3 (H_{03}): There is no significant difference in the urban unemployment rate in India among before, during and after lockdown phases.*

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Research Design: The various components of research methodology adopted in this research paper are given below.
Data Sources: The data is collected from CMIE database.

Sampling Frame: Three types of unemployment rates i.e. total unemployment rate, rural unemployment rate, and urban unemployment rate constitute the sampling frame.

Sample Size: Monthly unemployment rate data of last 7 years are collected from the database for each category of unemployment. Then, the data are divided into three phases. i.e. (i) Before the Lockdown Phase (Jan 2016 – Mar 2020), (ii) During the Lockdown Phase including first and second waves (April 2020 – June 2021), and (iii) After the Lockdown Phase (July 2021 – Dec 2022).

Data Analysis Techniques

1. Kolmogorov – Smirnov test and Shapiro - Wilk test are used to test the normality of the data set.
2. Levene Statistic is computed to test the homogeneity of variances in the data set.

3. Kruskal – Wallis Test is used to test whether there is any significant difference among the total, rural and urban unemployment rates in India before, during and after the lockdown phases.
4. If the significance difference is found, then Mann – Whitney U test is used to identify where from this significant difference is emanating by taking two phases at a time.

Limitations of Study: The study is based on the total, rural, and urban unemployment rates that are measured in terms of monthly %. However, if the data is taken in terms of quarterly, half yearly and o annual basis, the results may differ.

RESULTS AND DISCUSSION

This section is divided into three sections by taking each type of unemployment rate series at one time. The three series that are considered in the study are; (i) Total Unemployment Rate in %, (ii) Rural Unemployment Rate in %, (iii) Urban Unemployment Rate in %

RESULTS AND DISCUSSION RELATED TO TOTAL UNEMPLOYMENT RATE

Data collected from Centre for Monitoring Indian Economy (CMIE) related to total unemployment rate (%) in India is given below Table 1.

Table 1
MONTHLY TOTAL UNEMPLOYMENT RATE IN INDIA (IN %)

Year / Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2016	8.72	8.46	8.73	8.9	9.65	8.91	8.51	9.59	8.43	6.71	6.51	6.4
2017	5.93	5.01	4.67	3.87	4.03	4.12	3.37	4.07	4.63	5	4.72	4.74
2018	5.01	5.87	6	5.57	5.14	5.75	5.66	6.27	6.47	6.83	6.65	7.02
2019	6.86	7.2	6.65	7.35	7.03	7.87	7.34	8.19	7.14	8.1	7.23	7.6
2020	7.22	7.76	8.75	*23.52*	*21.73*	*10.18*	*7.4*	*8.35*	*6.68*	*7.02*	*6.5*	*9.06*
2021	*6.52*	*6.89*	*6.5*	*7.97*	*11.84*	*9.17*	6.96	8.32	6.86	7.74	6.97	7.91
2022	6.56	8.11	7.57	7.83	7.14	7.83	6.83	8.28	6.43	7.92	8.03	8.3

(Source: CMIE Database).

As mentioned in the research methodology section, the data set is divided into three phases i.e. (i) Before the Lockdown Phase (ii) During the Lockdown Phase, and (iii) After the Lockdown Phase. The highest and lowest total unemployment rates in before the lockdown phase are 9.65% and 3.37%.During the lockdown phase, the highest and lowest total unemployment rates observed are 23.52% and 6.5%.

However, the highest and lowest total unemployment rates recorded after the lockdown phase in India are 8.32% and 6.56%. On calculation, the mean total unemployment rate for before, during and after the lockdown phases are found to be 6.63%, 9.95% and 7.53% respectively. The data related to these phases are tested for their normality and homogeneity of variances and the results are tabulated below Table 2.

Table 2
NORMALITY AND HOMOGENEITY TEST RESULTS
(TOTAL UNEMPLOYMENT RATE)

Phase	Kolmogorov – Smirnov		Shapiro - Wilk	
	Statistic	Significance	Statistic	Sig. Level
Before Lockdown	0.078	0.20	0.97	0.37
During Lockdown	0.291	0.00	0.66	0.00
After Lockdown	0.184	0.11	0.90	0.07
			Levene Statistic	**Sig. Level**
Based on Mean			14.33	0.00

Based on Median	6.26	0.00
Based on Median and with adjusted df	6.26	0.01
Based on trimmed mean	10.42	0.00

(Source: Results after data analysis).

If the significance level value is higher than 0.05, then the series is said to be normal and vice versa. In the first half of the table, two series i.e. before lockdown and after lockdown series are normal whereas during lockdown series is non-normal since its significance level (0.00) is lesser than α = 0.05.

The entire data set related to three phases i.e. series are tested for homogeneity of variances and the results are provided in the second half of the above table. If the significance level value is higher than 0.05, then the series is said to have homogeneity of variances and vice versa. All the tests based on mean, median, median with adjusted degrees of freedom, and trimmed mean have provided significance level values lesser than α = 0.05. Thus, the series are non-homogeneous.

Since, one series is non-normal and there is no homogeneity of variances, Kruskal–Wallis test is used to know whether there is any significant difference in the total unemployment rate in India before, during and after the lockdown phases. After performing the test, if the significance level value obtained is higher than 0.05, then there is no significant difference among the three phases and the converse is also true. However, when the significance difference is found, then a post-hoc analysis is conducted by taking two series at a time with the help of Mann – Whitney U test to identify where from this significant difference is emanating. After performing the test, if the significance level value obtained is

Table 3 KRUSKAL – WALLIS AND MANN – WHITNEY U TEST RESULTS (FOR TOTAL UNEMPLOYMENT RATE)					
	Mean Rank		**Chi-Square**	**df**	**Sig. Level**
Before Lockdown	35.86		10.26	2	0.01
During Lockdown	56.50				
After Lockdown	49.64				
Comparison	**Phases**	**N**	**Mean Rank**	**Mann – Whitney U**	**Wilcoxon – W**	**Sig. Level (2-tailed)**
1	Before the Lockdown	51	29.89	199	1525	0.005
	During the Lockdown	15	45.77			
2	During the Lockdown	15	18.73	109	280	0.361
	After the Lockdown	18	15.56			
3	Before the Lockdown	51	31.97	305	1631	0.035
	After the Lockdown	18	43.58			

higher than 0.05, then there is no significant difference between the selected two phases and vice versa. The results of Kruskal- Wallis and Mann – Whitney U test are tabulated below.
(Source: Results after data analysis).

In the first half of the table, the results of Kruskal Wallis test are provided. The significance level found to be 0.01 which is lesser than α = 0.05. It means that there is a significant difference among the total unemployment rates in India before, during and after the lockdown phases.

In the second half of the table, Mann – Whitney U test results are furnished. Based on the significance level value, it is inferred that there is no significant difference between during and after the lockdown phases however, there is a significant difference between (i) before and during, and (ii) before and after lockdown phases.

RESULTS AND DISCUSSION RELATED TO RURAL UNEMPLOYMENT RATE

Data collected from Centre for Monitoring Indian Economy (CMIE) related to rural unemployment rate (%) in India is given below Table 4.

Year / Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2016	7.92	7.55	7.36	7.79	8.52	8.26	7.22	8.85	7.82	6.29	5.96	5.82
2017	5.11	4.35	4.14	3.72	3.65	3.78	3.01	3.59	4.13	4.52	4.39	4.46
2018	4.43	5.53	5.95	5.29	4.65	5.32	5.42	6.06	6.05	6.69	6.32	6.8
2019	6.05	6.97	6.15	7.25	6.3	7.69	6.9	7.48	5.99	8.02	6.45	6.93
2020	6.06	7.34	8.44	*22.89*	*21.11*	*9.49*	*6.51*	*7.65*	*5.88*	*6.95*	*6.24*	*9.15*
2021	*5.81*	*6.85*	*6.15*	*7.13*	*10.55*	*8.75*	6.34	7.64	6.04	7.91	6.41	7.28
2022	5.83	8.37	7.24	7.18	6.63	8.07	6.17	7.68	5.83	8.19	7.61	7.44

Table 4
MONTHLY RURAL UNEMPLOYMENT RATE IN INDIA (IN %)

(Source: CMIE Database).

This dataset is also divided into three phases i.e. (i) Before the Lockdown Phase (ii) During the Lockdown Phase, and (iii) After the Lockdown Phase. The highest and lowest rural unemployment rates in before the lockdown phase are 8.85% and 3.01%.During the lockdown phase, the highest and lowest rural unemployment rates observed are 22.89% and 5.81%.

However, the highest and lowest rural unemployment rates recorded after the lockdown phase in India are 8.37% and 5.83%. On calculation, the mean rural unemployment rate for before, during and after the lockdown phases are found to be 6.09%, 9.40% and 7.10% respectively. The data related to these phases are tested for their normality and homogeneity of variances and the results are tabulated below Table 5.

Table 5
NORMALITY AND HOMOGENEITY TEST RESULTS
(RURAL UNEMPLOYMENT RATE)

Phase	Kolmogorov – Smirnov		Shapiro - Wilk	
	Statistic	Significance	Statistic	Sig. Level
Before Lockdown	0.089	0.20	0.97	0.25
During Lockdown	0.294	0.00	0.66	0.00
After Lockdown	0.148	0.20	0.93	0.20
			Levene Statistic	Sig. Level
Based on Mean			12.43	0.00
Based on Median			5.33	0.00
Based on Median and with adjusted df			5.33	0.02
Based on trimmed mean			9.4	0.00

(Source: Results after data analysis).

In the first half of the table, two series i.e. before lockdown and after lockdown series are normal whereas during lockdown series is non-normal since its significance level (0.00) is lesser than $\alpha = 0.05$. The entire data set related to three phases i.e. series are tested for homogeneity of variances and the results are provided in the second half of the above table.

All the tests based on mean, median, median with adjusted degrees of freedom, and trimmed mean have provided significance level values lesser than α = 0.05. Thus, the series are non-homogeneous. Since, one series is non-normal and there is no homogeneity of variances, Kruskal–Wallis test is used to know whether there is any significant difference in the rural unemployment rate in India before, during and after the lockdown phases.

However, when the significance difference is found, then a post-hoc analysis is conducted by taking two series at a time with the help of Mann – Whitney U test to identify where from this significant difference is emanating. The results of Kruskal- Wallis and Mann – Whitney U test are tabulated below Table 6.

Table 6 KRUSKAL – WALLIS AND MANN – WHITNEY U TEST RESULTS (FOR RURAL UNEMPLOYMENT RATE)						
		Mean Rank		Chi-Square	df	Sig. Level
Before Lockdown		35.19		12.04	2	0.00
During Lockdown		56.63				
After Lockdown		51.44				
Comparison	Phases	N	Mean Rank	Mann – Whitney U	Wilcoxon – W	Sig. Level (2-tailed)
1	Before the Lockdown	51	29.77	193	1519	0.004
	During the Lockdown	15	46.17			
2	During the Lockdown	15	18.47	113	284	0.426
	After the Lockdown	18	15.78			
3	Before the Lockdown	51	31.41	276	1602	0.012
	After the Lockdown	18	45.17			

(Source: Results after data analysis).

In the first half of the table, the results of Kruskal Wallis test are provided. The significance level found to be 0.00 which is lesser than α=0.05. It means that there is a significant difference among the rural unemployment rates in India before, during and after the lockdown phases. In the second half of the table, Mann – Whitney U test results are furnished. Based on the significance level value, it is inferred that there is no significant difference between during and after the lockdown phases however, there is a significant difference between (i) before and during, and (ii) before and after lockdown phases.

RESULTS AND DISCUSSION RELATED TO URBAN UNEMPLOYMENT RATE

Data collected from Centre for Monitoring Indian Economy (CMIE) related to urban unemployment rate (%) in India is given below Table 7.

Table 7 MONTHLY URBAN UNEMPLOYMENT RATE IN INDIA (IN %)												
Year / Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
2016	10.44	10.38	11.56	11.22	12.1	10.27	11.12	11.17	9.76	7.6	7.62	7.63
2017	7.67	6.38	5.78	4.19	4.85	4.84	4.14	5.08	5.7	5.98	5.41	5.36
2018	6.24	6.59	6.1	6.19	6.18	6.64	6.15	6.72	7.38	7.12	7.33	7.48
2019	8.58	7.69	7.72	7.57	8.58	8.26	8.3	9.71	9.58	8.27	8.88	9.02
2020	9.7	8.65	9.41	*24.95*	*23.14*	*11.68*	*9.37*	*9.83*	*8.45*	*7.18*	*7.07*	*8.84*

| 2021 | *8.09* | *6.99* | *7.27* | *9.78* | *14.72* | *10.08* | 8.32 | 9.78 | 8.64 | 7.37 | 8.2 | 9.3 |
| 2022 | 8.14 | 7.57 | 8.28 | 9.22 | 8.24 | 7.32 | 8.22 | 9.57 | 7.71 | 7.34 | 8.92 | 10.09 |

(Source: CMIE Database).

This dataset is also divided into three phases i.e. (i) Before the Lockdown Phase (ii) During the Lockdown Phase, and (iii) After the Lockdown Phase. The highest and lowest urban unemployment rates in before the lockdown phase are 12.1% and 4.14%. During the lockdown phase, the highest and lowest rural unemployment rates observed are 24.95% and 6.99%. However, the highest and lowest rural unemployment rates recorded after the lockdown phase in India are 10.09% and 7.32%.

On calculation, the mean urban unemployment rate for before, during and after the lockdown phases are found to be 7.77%, 11.16% and 8.45% respectively. The data related to these phases are tested for their normality and homogeneity of variances and the results are tabulated below Table 8.

Table 8 NORMALITY AND HOMOGENEITY TEST RESULTS (URBAN UNEMPLOYMENT RATE)				
Phase	Kolmogorov – Smirnov		Shapiro - Wilk	
	Statistic	Significance	Statistic	Sig. Level
Before Lockdown	0.098	0.20	0.97	0.38
During Lockdown	0.310	0.00	0.71	0.00
After Lockdown	0.174	0.15	0.94	0.26
			Levene Statistic	Sig. Level
Based on Mean			13.84	0.00
Based on Median			6.15	0.00
Based on Median and with adjusted df			6.15	0.00
Based on trimmed mean			1.4	0.00

(Source: Results after data analysis).

In the first half of the table, two series i.e. before lockdown and after lockdown series are normal whereas during lockdown series is non-normal since its significance level (0.00) is lesser than $\alpha = 0.05$. The entire data set related to three phases i.e. series are tested for homogeneity of variances and the results are provided in the second half of the above table. All the tests based on mean, median, median with adjusted degrees of freedom, and trimmed mean have provided significance level values lesser than $\alpha = 0.05$. Thus, the series are non-homogeneous.

Since, one series is non-normal and there is no homogeneity of variances, Kruskal–Wallis test is used to know whether there is any significant difference in the urban unemployment rate in India before, during and after the lockdown phases. However, when the significance difference is found, then a post-hoc analysis is conducted by taking two series at a time with the help of Mann – Whitney U test to identify where from this significant difference is emanating. The results of Kruskal- Wallis and Mann – Whitney U test are tabulated below.

Table 9 KRUSKAL – WALLIS AND MANN – WHITNEY U TEST RESULTS (FOR URBAN UNEMPLOYMENT RATE)						
			Mean Rank	Chi-Square	df	Sig. Level
Before Lockdown			37.05	7.45	2	0.02
During Lockdown			55.50			
After Lockdown			47.11			
Comparison	Phases	N	Mean Rank	Mann –Whitney U	Wilcoxon – W	Sig. Level (2-tailed)
1	Before the Lockdown	51	30.27	218	1544	0.01
	During the Lockdown	15	44.47			
2	During the Lockdown	15	19.03	105	276	0.27
	After the Lockdown	18	15.31			
3	Before the Lockdown	51	32.77	345	1672	0.12
	After the Lockdown	18	41.31			

(Source: Results after data analysis).

In the first half of the table, the results of Kruskal Wallis test are provided. The significance level found to be 0.02 which is lesser than α = 0.05. It means that there is a significant difference among the urban unemployment rates in India before, during and after the lockdown phases. In the second half of the table, Mann – Whitney U test results are furnished. Based on the significance level value, it is inferred that there is no significant difference between before and during the lockdown phases however, there is a significant difference between (i) during and after, and (ii) before and after lockdown phases.

FINDINGS OF THE RESEARCH PAPER

After analyzing the data related to total, rural and urban unemployment rates in % that is split into three phases i.e. before, during and after the lockdown in India; this research paper has found the following.

1. There is a significant difference in total unemployment rate between before and during lockdown phases.
2. There is no significant difference in total unemployment rate between during and after the lockdown phases.
3. There is a significant difference in total unemployment rate between before and after the lockdown phases.
4. There is a significant difference in rural unemployment rate between before and during the lockdown phases.
5. There is no significant difference in rural unemployment rate between during and after the lockdown phases.
6. There is a significant difference in rural unemployment rate between before and after the lockdown phases.
7. There is a significant difference in urban unemployment rate between before and during the lockdown phases.
8. There is no significant difference in rural unemployment rate between during and after the lockdown phases.
9. There is no significant difference in rural unemployment rate between before and after the lockdown phases.

These findings are summarized in the following table 10.

Table 10 SUMMARY OF RESEARCH FINDINGS

Category of Unemployment	Before and During Lockdown	During and After Lockdown	Before and After Lockdown
Total Unemployment Rate	Significant difference exists	Significant difference does not exist	Significant difference *exists*
Rural Unemployment Rate	Significant difference exists	Significant difference does not exist	Significant difference *exists*
Urban Unemployment Rate	Significant difference exists	Significant difference does not exist	Significant difference *does not exist*

(Source: Results after data analysis).

IMPLICATIONS AND RECOMMENDATIONS

The before and during phases of lockdown are past and after phase is current and continue into the future. If the during phase is assumed to be an error in the time series, then before and after comparisons are very crucial in order to assess the impact of this error i.e. Covid-19 lockdown on unemployment time series data. Thus, the findings of this paper have the following implications.

In case of total unemployment rate, this paper found that there is a significant difference between before (6.63%) and after (7.53%) lockdown phases. It implies that the lockdown has a statistically significant impact on total unemployment rate in India. Thus, it is recommended to the union and state governments in India to take appropriate measures to reduce the total unemployment rate.

In case of rural unemployment rate also, this paper found that there is a significant difference between before (6.09%) and after (7.10%) lockdown phases. It implies that the lockdown has a statistically significant impact on rural unemployment rate in India. Thus, here also it is recommended to the union and state governments in India to take appropriate measures to reduce the rural unemployment rate.

Interestingly, in case of urban unemployment rate, this research paper found that there is no significant difference between before (7.77%) and after (8.45%) lockdown phases. It implies that the lockdown has no statistically significant impact on urban unemployment rate in India. It means that COVID- 19 lockdown has not affected the unemployment rate in urban areas. An attention-grabbing finding here is that though there is no significant impact of COVID-19 lockdown on unemployment rate in urban areas, this rate is higher than both the total and rural unemployment rates.

FUTURE SCOPE FOR STUDY

The study is based on the total, rural, and urban unemployment rates that are measured in terms of monthly percentage at India level. However, future researchers may collect the unemployment data state-wise and trace out the state that is affected heavily by lockdown. Further, future researchers may also collect the data sector-wise or industry wise and trace out the sector or industry that is affected a lot by lockdown.

CONCLUSION

This research paper focused on assessing the impact of COVID – 19 lockdown on unemployment rate in India. It has collected data related to three types of unemployment rates i.e. total unemployment rate, rural unemployment rate and urban unemployment rates from CMIE database. Further, it is divided each data set into three phases i.e. before, during,

and after the lockdown. After analyzing the data, it is found in case of total and rural unemployment rates that there is a significant difference between before and after lockdown phases. But, in case of urban unemployment, it is found that before and after unemployment rates are not statistically significant. Thus, the situations before and after the lockdown are found to be same. When compared it with total and rural unemployment rates, it is found that urban unemployment rate is higher than that of both total and rural unemployment rates. Thus, it is recommended to the union and state governments in India to take appropriate measures to reduce total, rural and urban unemployment rates.

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