Engineering Economics (SM300) Project Report

On

Impact of COVID-19 on Employment, Transport and Healthcare Sectors of Delhi

Submitted by

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Chapter 1: Introduction

1.1 Aim of the Study

This paper aims to conduct a statistical analysis on the impact of the Coronavirus pandemic and subsequent measures such as the lengthy lockdowns, social distancing norms, work from home procedures, etc on various sectors in the state of Delhi. Delhi is home to a wide variety of sectors ranging from IT or telecommunications to tourism, banking and even consumer goods.

By means of this project, data is collected from various credible sources over periods of time encompassing the years before COVID-19 and the months after. This data is then analysed in order to observe the trends or the changes that were brought about by the COVID-19 pandemic in the state.

The data collected will pertain to various vital sectors in Delhi that contribute significantly to the economy of the state as well as the nation. These sectors or sub-sections include employment, transport and healthcare.

Finally a conclusion is drawn with respect to each sector that observes either a positive, negative or no change in patterns before and after the pandemic.

1.2 Background on the state of Delhi

Delhi is the capital of India and also a state for administrative purposes. It is one of the largest metropolises in the country. Delhi shares its borders with the states of Uttar Pradesh and Haryana. Delhi has a cosmopolitan culture with a mix of languages in use such as hindi, english, punjabi, etc. Delhi is divided into 33 sub-divisions under 11 districts.

As Delhi is the seat of Central Government, it has an important position in the country in terms of formulation of policies. It has also become an important centre of trade and commerce, as a number of key industry associations operate in the state. The state also hosts several trade conventions & fairs throughout the year.

Delhi has emerged as a key state with immense scope for development of the service industry such as BFSI, IT and ITeS, and consulting, among others. It has an attractive real estate market & is a preferred tourist destination. Many global corporations have offices in the state. It houses a few of the country's most prestigious institutes such as IIT, IIFT, FMS & AIIMS. The state has a huge potential for agrochemical-based products. The state has more than 100 per cent telecom penetration & high internet penetration. It is well connected across the country and the globe by the means of an international airport, a well-developed network of railways and metro infrastructure.

1.3 Economy of the State

The economy of Delhi is the 13th largest among states and union territories of India. The nominal Gross State Domestic Product (GSDP) of the National Capital Territory of Delhi for 2017-18 was estimated at ₹6.86 lakh crore recording an annual growth of 8.1%. Annual growth rate from 2013-18 was 11.5%. Sector Wise, agriculture contributed 2% to the GSDP, Service Sector 86% and Industry 12% (2017-18).[12]

1.4 COVID-19 in the State of Delhi

The first case of the COVID-19 pandemic in Delhi was reported on 2 March 2020. Today, Delhi has the third highest number of confirmed cases of COVID-19 pandemic in India after Maharashtra and Tamil Nadu. The total number of infected people reported as on 11th October 2020 is 451K out of which number of people that recovered from the virus is 403K and the total number of deaths is 7413.[1][2]

On 22 March, Delhi observed a 14-hour voluntary public curfew named Janata curfew along with 75 districts in India at the directive from PM prior to his order of nationwide lockdown for 21 days from 24 March 2020.

Two past events brought about a significant increase in the number of cases in the state. One was the migration of thousands of migrant labourers from Uttar Pradesh and Bihar gathered in Anand Vihar Bus Station on 29 March 2020. The other event was a religious gathering which saw a participation of more than 3000 people in the Nizamuddin Markaz Mosque in the Nizamuddin West area. The participants were then quarantined after suspected contact with infected people. A brief timeline of the pandemic in the state:

March: Declared an epidemic, all schools, colleges, cinema halls, restaurants closed and gatherings over 20 people restricted. 14 hours "Janta Curfew" declared and the state government announced lockdown from 23rd to 31st of march followed by the extension of the nationwide lockdown till 14th april.

April: Provision of ration to all needy persons, operation SHIELD by and disinfection drive by state government carried out, nationwide lockdown extended until 3rd may.

May: Nationwide lockdown until 17th May and 11 districts of Delhi declared as red zones.

June: Delhi Health Minister pledged to donate plasma after recovery, Delhi CM announced to setup a plasma bank at Delhi

July: by this time, Delhi had surpassed most of the states in India, thus making the biggest accounts of COVID patients everyday, with a spike of 2,000 cases on an average everyday. This made it difficult for the Delhi government to make further plans for the reopening

Additionally, it was reported that air quality index of Delhi improved on 28 March 2020 after the lockdown and reduced vehicular movements

1.5 Employment and Jobs in Delhi

According to the NSS 66th round survey on "Employment and Unemployment Situation in Delhi" (July 2009 – June 2010) [3], the total number of households in Delhi were estimated at 36.48 lakhs, with 0.96 lakhs in rural and 35.52 lakhs in urban. The distribution of household by principal household industry reveals that the principal household industry of 28.23% households was trade followed by 27.55% services, 20.44% manufacturing, 9.37% transport, 8.21% Construction, 0.70% agriculture, 0.57% electricity, gas and water and remaining 4.95% others (non-economic activities).
Whereas the distribution of household by principal occupation reveals that about 39.48% of household's principal occupation was "Craft and related works, plant and machinery operators and assemblers, elementary occupations", followed by 33.70% senior officials and manager, professionals, 11.16% service workers and shop and market sales workers, 5.00% clerical related works, 4.83% technicians and associates professionals, 0.87% skilled agricultural and fishery workers, and the remaining 4.95% workers not classified by occupation.
COVID-19 saw a rate of unemployment higher than ever in the state of Delhi during the year of 2020. As a part of this study, we present data that highlights the grave unemployment situation in Delhi and compares it to the past years as well as to other states, among various sub-sectors, labour force, labour force participation rate, and age groups. Alongside this, we also obtain data for urban and rural regions of the state. We compare our findings before and after the COVID-19 pandemic in order to draw conclusions.

1.6 Transport Sector

Delhi Transport Corporation (DTC) is the main public transport operator of Delhi. It is one of the largest CNG-powered bus service operators in the world.Delhi Transport Corporation operates on many routes in Delhi and neighbouring States. The mofussil buses operate around 46 depots out of which 18 depots are of old DTC buses and rest have low floor buses while the inter-state buses operate from the Three Inter State Bus Terminals in Kashmiri Gate, Sarai Kale Khan and Anand Vihar.Delhi Transport Corporation services in Delhi has vastly distributed network of bus services. It connects almost every part of Delhi with this network of buses. The most Prominent of these being the *Mudrika* and the *Bahri Mudrika Seva* services interconnecting all parts of the city with a great frequency of buses until approximately 10:30 p.m.It is having a fleet of 3800 buses, apart from this there are 2400 DIMTS buses, taking total fleet to 6200 buses

Delhi Metro is the largest and busiest rapid transit system in India connecting the country's capital region with satellite cities. The metro system is operated by Delhi Metro Rail Corporation (DMRC), a public sector company established by the Government of India and the Government of Delhi in March 1995. The project was developed in multiple phases. Phase one (65.11km) and phase two (124.9km) are completed, while phase three is currently underway. A phase four is also planned with works expected to begin in 2020. The Delhi Metro project became the first railway project in the world to be certified for carbon credits for reducing greenhouse gas emissions by the United Nations in 2011. DMRC saved 112.5GW of power by using regenerative brakes in the trains and reduced carbon emissions by 630,000t a year.

1.7 Healthcare Sector

The healthcare sector is one of the most important and revenue generating sectors in the world. Unlike other sectors whose demand fluctuates from low to high based on multiple factors, health care is one such field which always tends to have at least a certain amount of demand irrespective of the circumstance and external factors. This is also a sector which surged massively during the COVID 19 times as efforts to come up with vaccines, tablets and other drugs capable of either curing or minimizing the symptoms increased manifold. In this section, we will discuss the healthcare sector before COVID-19, during and our prediction for the sector in the coming years in the city of Delhi. We will also discuss a pharmaceutical company situated in this city and observe how they have fared before and during the pandemic.

Chapter 2: Data

2.1 Employment

Source
Source of all data used in this section is a survey conducted by the Centre for Monitoring Indian Economy (CMIE)[4].

Method
The unemployment rate in India is estimated from data collected regarding the employment/unemployment status of all members of 15 years and more of a sample of randomly selected households. The individuals surveyed are members of a panel of households included in CMIE's Consumer Pyramids survey. Answers to employment/unemployment status questions are administered along with CMIE's Consumer Pyramids survey. CMIE's Consumer Pyramids panel of households contains over 174,405 households. These include over 522,000 members who are 15 or over 15 years of age.

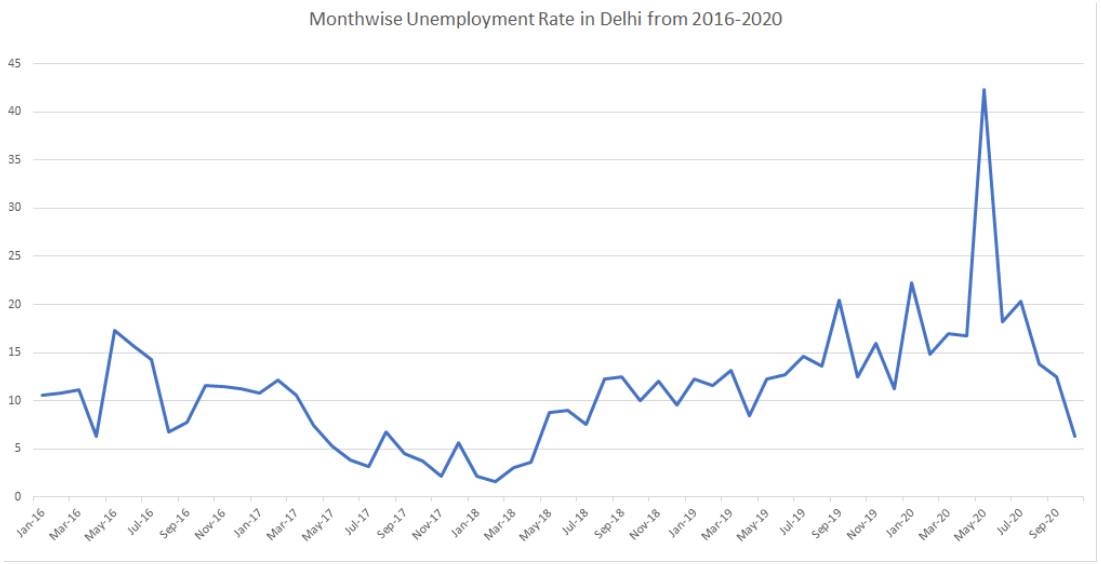


Figure 1: *Month Wise Unemployment Rate from 2016-2020 saw a peak of 44.9% in May 2020 after a rise of 28.2% points from the previous month in Delhi*

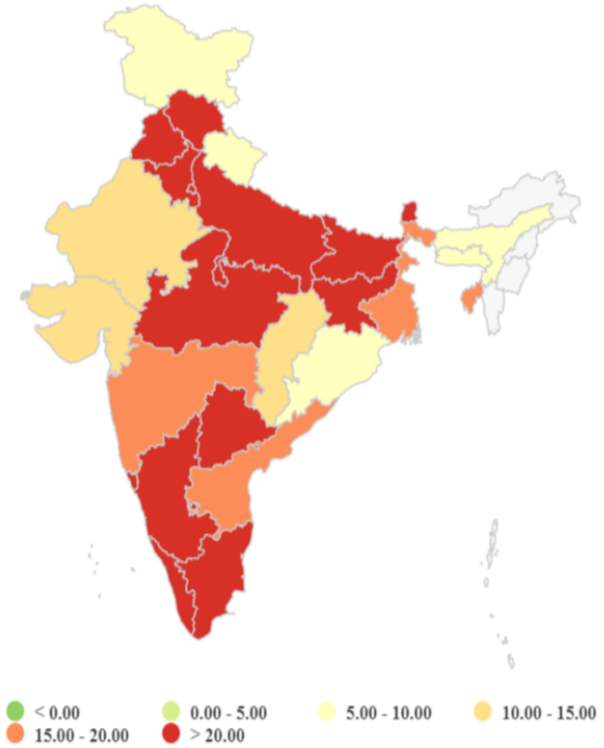


Figure 2: *Unemployment Rates across the states of India in May 2020 wherein Delhi is one among the states having the highest unemployment rates*

Following part of the section uses data to obtain an in-depth analysis of the unemployment situation.

Time Period

The survey data used consists of different time periods each four months long, namely, May-August 2019, September-December 2019, January-April 2020 and May-August 2020.

Definitions of Terms Used

Labour Force (LF)

Labour force consists of persons who are of 15 years of age or more and are either of the following two categories: 1. are employed 2. are unemployed and are willing to work and are actively looking for a job.

Greater Labour Force (GLF)

Greater labour force consists of persons who are of 15 years of age or more and are either of the following three categories: 1. are employed 2. are unemployed and are willing to work and are actively looking for a job 3. are unemployed and are willing to work and are not actively looking for a job. **Labour Participation Rate (LPR)**

This is the ratio of the labour force to the population greater than 15 years of age.

Unemployment Rate (UER)

This is the unemployed who are willing to work and are actively looking for a job expressed as a percent of the labour force.

Greater Unemployment Rate (GUER)

This is the sum of the unemployed who are willing to work and are actively looking for a job and the unemployed who are willing to work and are not actively looking for a job, expressed as a percent of the greater labour force.

Data

May-August 2019

DL: Labour Force, Employment and Unemployment by Age Groups: Urban

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Partici-pation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemp-loyment Rate (%) (UER)	Greater Unemplo-yment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	1,958	14	0.71	7	7	7	21	50.00	66.67
20-24	2,867	566	19.76	217	350	84	650	61.73	66.67
25-29	1,531	783	51.14	454	329	119	902	41.96	49.61
30-34	1,196	601	50.29	496	105	35	636	17.44	21.98
35-39	958	566	59.12	468	98	7	573	17.28	18.29
40-44	1,475	580	39.34	517	63	28	608	10.84	14.94
45-49	1,559	846	54.26	748	98	63	909	11.57	17.69
50-54	1,224	636	52.00	580	56	14	650	8.79	10.75
55-59	951	427	44.85	350	77	35	461	18.03	24.24
60-64	496	35	7.04	35	0	7	42	0.00	16.67
>=65	1,182	28	2.37	21	7	0	28	25.00	25.00
>=15	15,396	5,083	33.02	3,895	1,189	399	5,482	23.38	28.95

Table 1: *Values of various indicators for different age groups in urban region of Delhi*

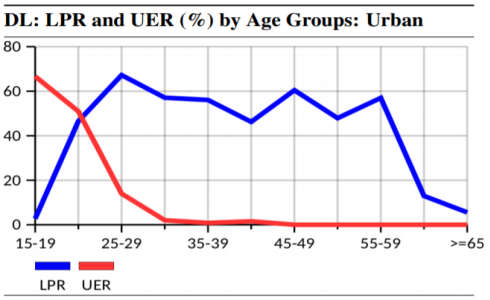


Figure 3: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in urban Delhi*

DL: Labour Force, Employment and Unemployment by Age Groups: Rural

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Partici-pation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemp-loyment Rate (%) (UER)	Greater Unemplo-yment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	48	1	1.39	0	0	2	2	33.33	81.82
20-24	72	29	39.69	14	15	4	33	52.71	58.78
25-29	49	28	56.62	22	6	1	28	20.16	22.05
30-34	52	26	51.07	26	1	0	27	2.52	4.13
35-39	44	26	59.60	26	0	1	27	0.85	3.31
40-44	39	17	44.07	17	0	0	17	0.00	0.00
45-49	43	24	55.67	24	0	0	24	0.93	0.93
50-54	30	15	51.49	15	0	0	15	0.00	0.00
55-59	21	10	45.74	10	0	0	10	0.00	0.00
60-64	13	2	11.86	2	0	0	2	0.00	0.00
>=65	54	2	3.67	2	0	0	2	0.00	0.00
>=15	464	179	38.54	157	22	8	187	12.27	15.91

Table 2: *Values of various indicators for different age groups in rural region of Delhi*

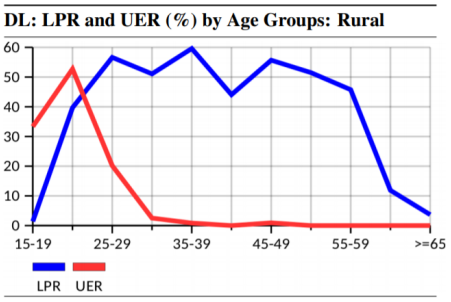


Figure 4: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in rural Delhi*

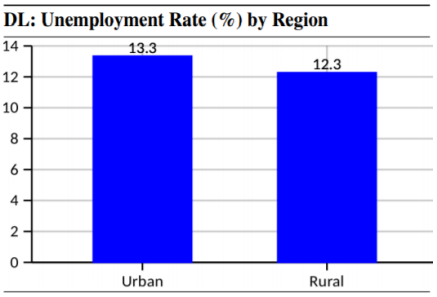


Figure 5: *Unemployment rates in urban and rural Delhi*

September-December 2019

DL: Labour Force, Employment and Unemployment by Age Groups: Urban

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Partici-pation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemp-loyment Rate (%) (UER)	Greater Unemplo-yment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	1,486	51	3.46	28	23	37	89	45.45	68.42
20-24	2,650	1,201	45.33	495	706	210	1,412	58.75	64.90
25-29	1,856	1,257	67.76	996	262	28	1,285	20.82	22.55
30-34	1,365	827	60.62	785	42	5	832	5.08	5.62
35-39	930	575	61.81	566	9	0	575	1.63	1.63
40-44	1,365	697	51.03	678	19	9	706	2.68	3.97
45-49	1,472	851	57.78	841	9	5	855	1.10	1.64
50-54	1,215	654	53.85	650	5	0	654	0.71	0.71
55-59	860	514	59.78	514	0	0	514	0.00	0.00
60-64	453	65	14.43	65	0	5	70	0.00	6.67
>=65	1,454	70	4.82	70	0	0	70	0.00	0.00
>=15	15,108	6,764	44.77	5,689	1,075	299	7,063	15.89	19.46

Table 3: *Values of various indicators for different age groups in urban region of Delhi*

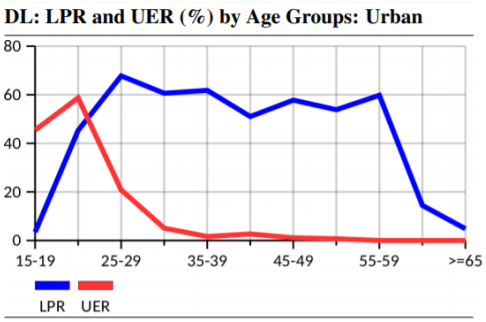


Figure 6: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in urban Delhi*

DL: Labour Force, Employment and Unemployment by Age Groups: Rural

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Partici-pation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemp-loyment Rate (%) (UER)	Greater Unemplo-yment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	48	2	3.40	0	1	0	2	71.43	77.78
20-24	71	30	42.11	13	17	1	31	57.03	58.96
25-29	51	31	59.82	24	6	2	33	20.61	25.18
30-34	53	28	52.65	27	1	0	28	3.36	4.96
35-39	41	25	59.32	24	0	0	25	1.90	1.90
40-44	40	18	46.15	18	0	0	18	0.00	0.00
45-49	43	24	55.49	24	0	0	24	0.00	0.00
50-54	33	17	51.43	17	0	0	17	0.00	1.37
55-59	25	11	44.76	11	0	0	11	0.00	0.00
60-64	11	2	14.29	2	0	0	2	0.00	0.00
>=65	57	2	2.89	2	0	0	2	0.00	0.00
>=15	473	188	39.72	162	26	4	192	13.84	15.83

Table 4: *Values of various indicators for different age groups in rural region of Delhi*

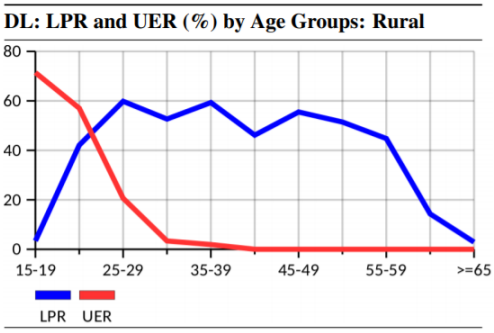


Figure 7: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in rural Delhi*

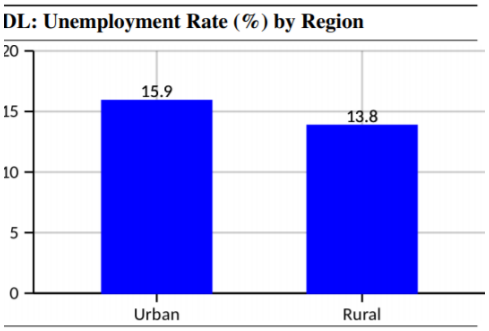


Figure 8: *Unemployment rates in urban and rural Delhi*

January-April 2020

DL: Labour Force, Employment and Unemployment by Age Groups: Urban

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Partici-pation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemp-loyment Rate (%) (UER)	Greater Unemplo-yment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	1,589	32	1.99	11	21	11	42	66.67	75.00
20-24	2,777	1,330	47.91	470	860	190	1,520	64.68	69.10
25-29	1,663	1,103	66.35	855	248	111	1,214	22.49	29.57
30-34	1,283	728	56.79	692	37	48	776	5.07	10.88
35-39	913	475	52.02	475	0	74	549	0.00	13.46
40-44	1,335	581	43.48	570	11	69	649	1.82	12.20
45-49	1,483	823	55.52	813	11	53	876	1.28	7.23
50-54	1,314	628	47.79	628	0	21	649	0.00	3.25
55-59	1,019	570	55.96	570	0	26	596	0.00	4.42
60-64	507	90	17.71	84	5	5	95	5.88	11.11
>=65	1,367	32	2.32	32	0	21	53	0.00	40.00
>=15	15,250	6,392	41.92	5,199	1,193	628	7,021	18.66	25.94

Table 5*: Values of various indicators versus age groups in urban region of Delhi*

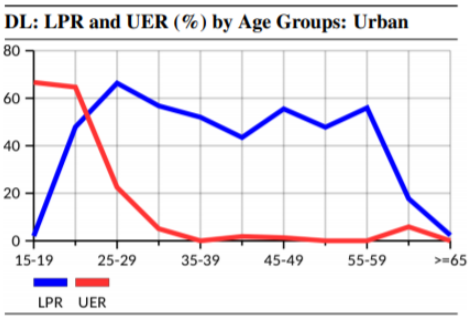


Figure 9: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in urban Delhi*

DL: Labour Force, Employment and Unemployment by Age Groups: Rural

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Partici-pation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemp-loyment Rate (%) (UER)	Greater Unemplo-yment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	50	1	1.10	0	0	1	1	50.00	75.00
20-24	69	26	38.55	10	16	3	30	60.42	64.81
25-29	48	27	56.32	19	8	2	29	29.59	34.29
30-34	54	25	46.94	24	1	2	27	4.35	10.20
35-39	46	27	57.74	26	1	1	28	2.06	5.94
40-44	41	19	46.62	19	0	0	19	0.00	1.43
45-49	41	21	50.67	21	0	1	21	0.00	2.56
50-54	33	17	51.26	17	0	1	17	0.00	3.17
55-59	26	10	38.30	10	0	0	10	0.00	2.70
60-64	14	1	9.80	1	0	0	1	0.00	0.00
>=65	61	1	2.25	1	0	0	2	0.00	16.67
>=15	482	175	36.36	149	26	10	186	14.76	19.56

Table 6: *Values of various indicators for different age groups in rural region of Delhi*

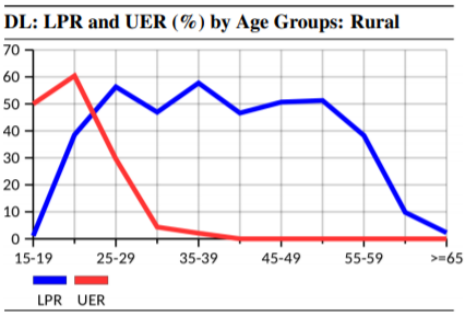


Figure 10: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in rural Delhi*

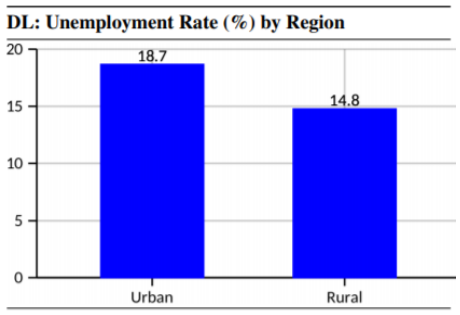


Figure 11: *Unemployment rates in urban and rural Delhi*

May-August 2020

DL: Labour Force, Employment and Unemployment by Age Groups: Urban

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Participation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemployment Rate (%) (UER)	Greater Unemployment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	1,958	14	0.71	7	7	7	21	50.00	66.67
20-24	2,867	566	19.76	217	350	84	650	61.73	66.67
25-29	1,531	783	51.14	454	329	119	902	41.96	49.61
30-34	1,196	601	50.29	496	105	35	636	17.44	21.98
35-39	958	566	59.12	468	98	7	573	17.28	18.29
40-44	1,475	580	39.34	517	63	28	608	10.84	14.94
45-49	1,559	846	54.26	748	98	63	909	11.57	17.69
50-54	1,224	636	52.00	580	56	14	650	8.79	10.75
55-59	951	427	44.85	350	77	35	461	18.03	24.24
60-64	496	35	7.04	35	0	7	42	0.00	16.67
>=65	1,182	28	2.37	21	7	0	28	25.00	25.00
>=15	15,396	5,083	33.02	3,895	1,189	399	5,482	23.38	28.95

Table 7: *Values of various indicators for different age groups in urban region of Delhi*

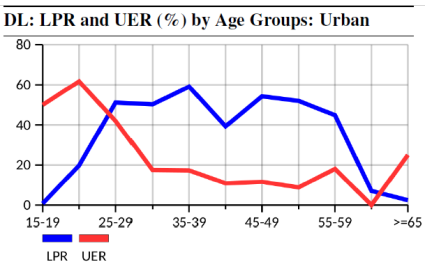


Figure 12: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in urban Delhi*

DL: Labour Force, Employment and Unemployment by Age Groups: Rural

Age Group (Years)	Population ('000s)	Labour Force ('000s) (LF)	Labour Partici-pation Rate (%) (LPR)	Employed ('000s) (E)	Unemployed, willing to work and active job seekers ('000s) (UE)	Unemployed, willing to work but inactive in seeking jobs ('000s)	Greater Labour Force ('000s) (GLF)	Unemp-loyment Rate (%) (UER)	Greater Unemplo-yment Rate (%) (GUER)
A	B	C	D=C/B	E	F	G	H=C+G	I=F/C	J=(F+G)/H
15-19	52	0	0.57	0	0	0	0	100.00	100.00
20-24	77	13	16.67	5	8	1	14	62.79	66.67
25-29	50	24	49.10	13	11	1	25	45.12	46.43
30-34	53	23	43.02	20	3	1	24	14.29	18.52
35-39	43	23	53.79	22	1	0	24	6.41	7.59
40-44	43	22	51.37	20	3	0	22	12.00	12.00
45-49	42	21	50.00	19	2	0	21	9.86	9.86
50-54	36	21	56.56	18	2	0	21	10.14	11.43
55-59	22	7	31.51	7	0	0	7	4.35	8.33
60-64	18	2	11.48	2	0	0	2	0.00	0.00
>=65	54	2	3.85	2	0	0	2	14.29	14.29
>=15	491	159	32.28	127	32	4	163	19.89	21.94

Table 8: *Values of various indicators for different age groups in rural region of Delhi*

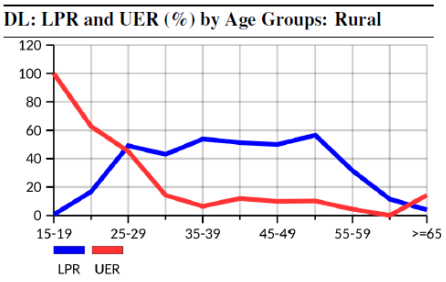


Figure 13: *Plot of Labour Participation Rate and Unemployment Rate versus age groups in rural Delhi*

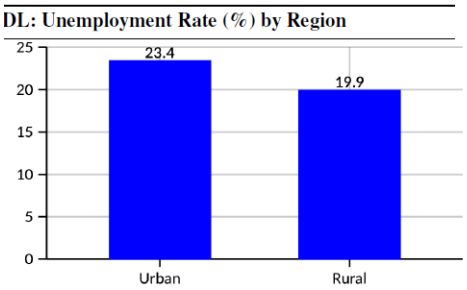


Figure 14: *Unemployment rates in urban and rural Delhi*

2.2 Transport Sector

Source

Source of all data used in this table is a record held by the Delhi Metro Rail Corporation(DMRC) Ltd[5].

Time Period: 2009 - 2018

Particulars	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16*	2016-17*	2017-18*	2018-19*
Revenue from Fare Box Collection	41,330.13	74,658.58	101,630.40	122,300.25	136,483.66	150,574.62	164,918.79	178,039.89	261,280.34	311,902.15
Other Revenue	32,456.01	86,135.65	123,147.07	146,447.77	183,294.35	206,521.90	270,563.45	360,753.27	359,824.92	334,250.06
Total Revenue	**73,786.14**	**160,794.23**	**224,777.47**	**268,748.02**	**319,778.01**	**357,096.52**	**435,482.24**	**538,793.16**	**621,105.26**	**646,152.21**
Earning before Interest, Depreciation & Tax (EBIDT)	35,590.32	75,049.58	93,335.20	102,783.76	106,208.29	123,990.05	128,173.90	143,309.36	183,571.57	196,274.52
Interest & Finance Cost	11,645.07	18,076.48	20,057.86	21,655.76	22,204.21	22,681.34	27,147.13	24,012.98	26,250.34	31,167.79
Depreciation & amortisation	32,963.74	58,243.38	80,087.22	81,922.32	90,077.75	128,855.03	148,100.58	154,111.80	171,819.54	241,539.01
Profit before Tax (PBT)	**(9,018.49)**	**(1,270.28)**	**(6,809.88)**	**(794.32)**	**(6,073.67)**	**(27,546.32)**	**(47,073.81)**	**(34,815.42)**	**(14,498.31)**	**(76,432.28)**
Profit after Tax (PAT)	(20,522.86)	(41,385.53)	(18,514.96)	(9,090.90)	(9,980.01)	(10,478.68)	(29,676.98)	(22,935.48)	(9,498.85)	(46,403.89)
Other Comprehensive Income*	-	-	-	-	-	-	249.09	(1,940.46)	185.19	180.49
Total Comprehensive Income*	-	-	-	-	-	-	(29,427.89)	(24,875.94)	(9,313.66)	(46,223.40)
Gross Property, Plant and Equipment and Intangible Assets	1,496,623.11	2,920,140.11	3,169,576.13	3,292,663.77	3,438,595.13	3,582,047.85	3,987,147.43	4,137,322.77	5,401,116.41	7,530,717.14
Net Property, Plant and Equipment and Intangible Assets	1,352,955.33	2,717,125.93	2,887,323.18	2,928,194.60	2,983,911.17	2,998,443.78	3,255,880.67	3,251,371.95	4,342,475.16	6,229,743.12
Current Assets, Loans & Advances	231,920.06	401,833.78	590,084.61	750,708.31	776,896.38	745,565.27	517,469.04	795,856.03	682,187.25	937,488.98
Current Liabilities and Provisions	203,008.55	252,433.70	178,627.98	219,809.02	240,917.94	302,132.19	168,477.55	606,480.13	692,337.48	694,011.39
Borrowings	1,452,324.81	1,625,900.55	1,776,325.39	1,917,570.30	2,194,146.43	2,455,307.03	2,914,785.28	3,417,364.07	3,790,236.73	4,059,649.42
Current maturities of borrowings	2,739.21	6,769.12	12,903.06	21,826.94	29,159.31	32,263.42	34,831.00	44,265.69	62,270.64	76,476.66
Net Worth	1,071,686.79	1,284,494.84	1,456,672.85	1,682,262.02	1,883,913.72	2,136,320.94	2,555,927.05	2,615,538.33	2,690,313.10	2,749,000.04
Key Indicators										
EBIDT/Total Revenue (%)	48.23%	46.67%	41.52%	38.25%	33.21%	34.72%	29.43%	26.60%	29.56%	30.38%
Debt/Equity	1.36	1.27	1.23	1.15	1.18	1.16	1.15	1.32	1.43	1.50
Current Ratio	1.14	1.59	3.30	3.42	3.22	2.47	3.07	1.31	0.99	1.35

Table 9: *Various expenses of Delhi Metro over the years*[5]

Source

The table below is an initiative by the Government of India (GoI), Sustainable Urban Transport Project (SUTP) with support of Global Environment Facility (GEF), United Nations Development Programme (UNDP) and World Bank (WB).

Time Period: 2011 - 2014

Vehicle	Volume	2011-12	2012-13	2013-2014
Car and Jeep	Total	2,343,113	2,474,087	2,629,343
	Growth (%)		31.82%	31.70%
Two wheeler	Total	4,644,146	4,962,507	5,297,697
	Growth (%)		63.83%	63.88%
Auto Rickshaw	Total	88,197	86,838	91,840
	Growth (%)		1.12%	1.10%
Taxi	Total	69,780	70,335	78,686
	Growth (%)		0.90%	0.94%
Bus (including emergency vehicles)	Total	64,033	39,694	40,947
	Growth (%)		0.51%	0.49%

Table 10: *Number of vehicles registered and their growth over the years*[6]

There are 8.29 million registered vehicles in the city as on 31st March 2014, which is the highest in India among all cities. Delhi and NCR experience traffic congestion every day, especially during peak hours, losing valuable man hours.

Time Period: 1988 - 2018

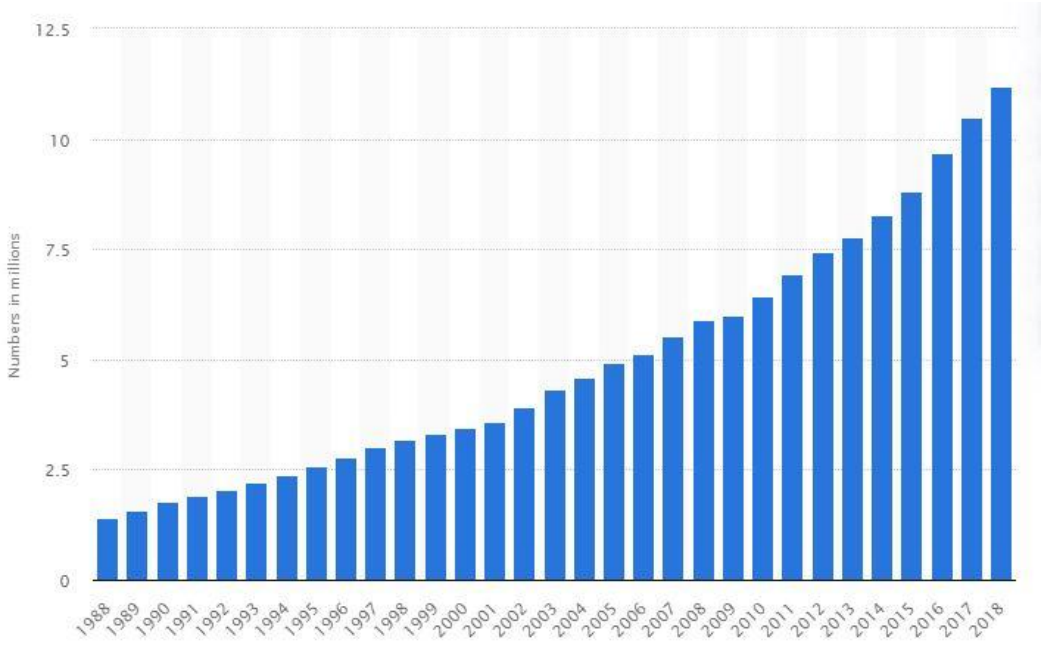


Figure 15: *Delhi Registered Vehicles*[7]

Source
Movement data is from Facebook Data for Good (Maas et al. 2019); Data on COVID-19 cases is from covid19india.org.

Time Period: 2020 March - May

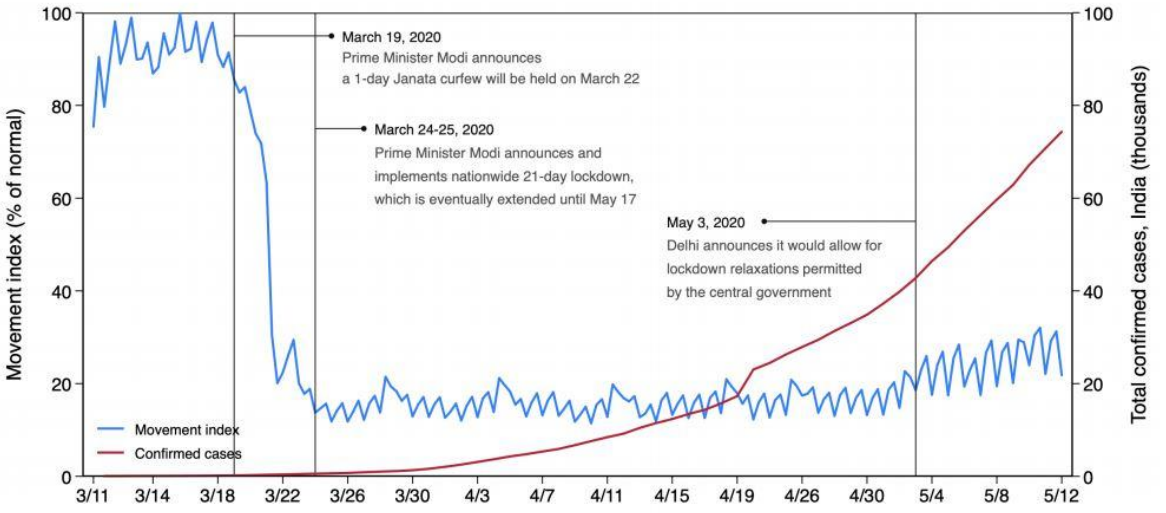


Figure 16: *Impact of the lockdown on general intra-city movement in Delhi*[8]

hg-2.3 Healthcare Sector

Source
Multiple sources have been used and thus the reference number is cited next to each figure and statistic found.

Pre COVID-19 Era

The number of hospitals present in delhi as of June 2019 are as follows:

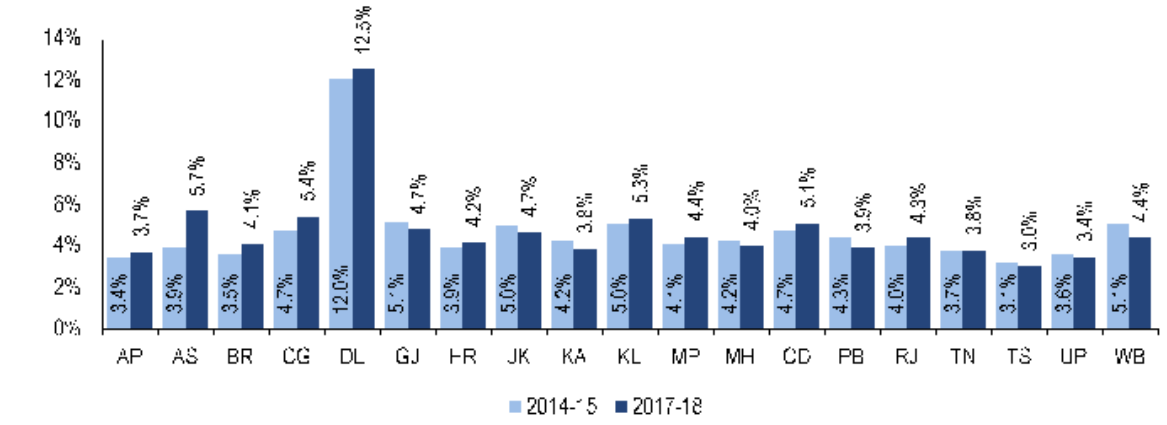
Sr. No.	Medical College	No.	No. of Seats
1	Government Medical College	6	900
2	Private Medical Colleges	2	200
3	Total Medical Colleges	8	1100

Table 11: *Number of hospitals present in Delhi as of June 2019.* [13]

The following data[14] shows a split up of Delhi's healthcare system and its variety of resources. Data regarding the past 2 years have been scarce and as a result pre covid times contains data from the years 2015 onwards.
The government investment in the health sector increased significantly from Rs 861.66 crore in 2007-08 to Rs 2,095.36 crore in 2016-17. The per capita expenditure by the Delhi government increased by 44 percent from Rs 1,547.55 to Rs 2,232.82 between 2011-12 and 2015-16.

At the end of year 2016-17, total bed capacity in Delhi was 53,329. Out of the total beds available in medical institutions across the city state, private nursing homes, private hospitals and voluntary organisations contribute 50.28 percent. On the other hand, medical institutions operated by the government of India, Delhi government and local bodies offer 20.90 percent, 20.45 percent and 8.1 percent of total beds respectively.

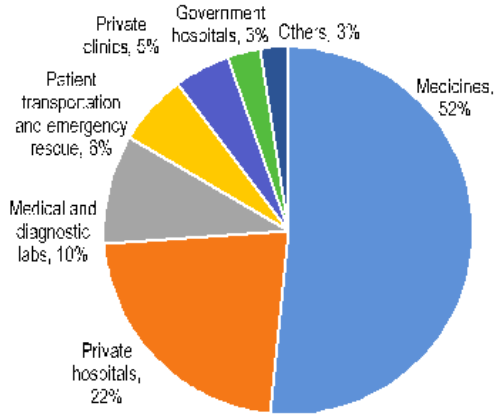
Over 12 percent of the budget is spent on health. Already, 17 hospitals are in various advanced stages of renovation and their infrastructure is being upgraded.The three-tier healthcare system, mohalla clinics, polyclinics and multi-speciality hospitals is improving healthcare infrastructure of Delhi.



Note: Figures for 2014-15 are actuals and 2017-18 are budget estimates.
Sources: State Budget Documents; RBI State of State Finances; PRS.

Figure 17*: Expenditure on health by states in 2014-2015 and 2017-2018 (as a % of total budget expenditure)*[14]

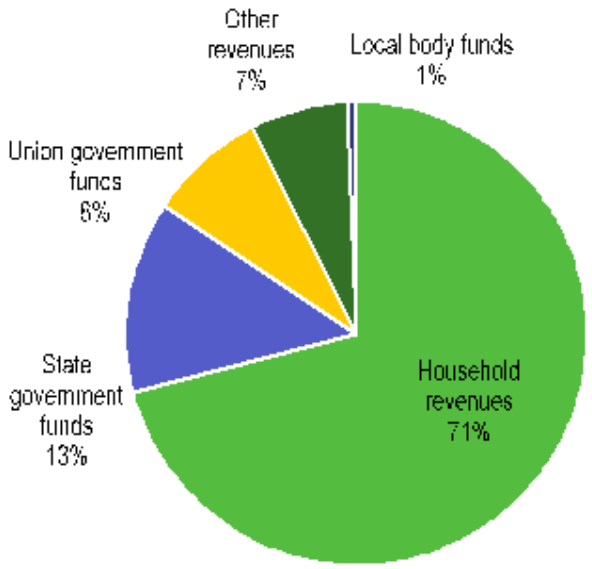
If cumulatively 30% of the total health expenditure is incurred by the public sector, the rest of the health expenditure, i.e. approximately 70% is borne by consumers. Household health expenditures include out of pocket expenditures (95%) and insurance (5%). Out of pocket expenditures– the payments made directly by individuals at the point of services which are not covered under any financial protection scheme– dominate. The highest percentage of out of pocket health expenditure (52%) is made towards medicines.



Source: Household Health Expenditures in India (2013-14), December 2016, Ministry of Health and Family Welfare; PRS.

Figure 18: *Major heads for which out of pocket expenditure is made*[14]

This is followed by private hospitals (22%), medical and diagnostic labs (10%), and patient transportation, and emergency rescue (6%). Out of pocket expenditure is typically financed by household revenues (71%) (see Figure 19).



Source: National Health Accounts, 2014-15; PRS.

Figure 19: *Sources of financing for current health expenditure*[14]

Out of the total number of persons covered under health insurance in India, three-fourths are covered under government-sponsored health schemes and the balance one-fourth are covered by private insurers. With respect to the government-sponsored health insurance, more claims have been made in comparison to the premiums collected, i.e., the returns to the government have been negative.
Most of the out of the pocket expenditure made by consumers is actually on buying medicines (52%) as seen earlier. Further, these purchases are mostly made for patients who do not need hospitalisation.

COVID 19 Era

There have been a total of 451K cases in Delhi as of November 8th according to Google statistics.
In March of 2020, the Delhi government announced an allocation of ₹ 7,704 crore for the health sector in its budget, with approving ₹ 2,578 crore for upgrading and expanding 16 hospitals.[15]
As of September 2nd, a total of 93 hospitals — 79 private and 14 government — are providing care to Covid patients. Out of this, 49 ventilator beds in 29 facilities are vacant. Overall, there are 1,216 ICU beds with ventilator support, out of which 486 are occupied and 730 are vacant.[15]
The resources needed for Delhi's healthcare sector as seen by the above figures is enormous. The entire healthcare industry as a whole has had to step up regarding the pandemic. Overall this sector is booming but the number of resources it needs is getting scarce. Though the stats above show vacancy of ventilator beds etc, from the pre COVID period we can see most people tend to use private hospitals and pay from their own pocket. As a result the industry is seen to cater to only those who can afford treatment and has not reached its full potential yet.
In general, the healthcare industry - consisting of pharmaceutical companies, hospitals, medical devices, clinical trials, outsourcing, telemedicine, medical tourism, health insurance and medical equipment is doing well due to the current high demand.

Chapter 3: Analysis

3.1 EMPLOYMENT

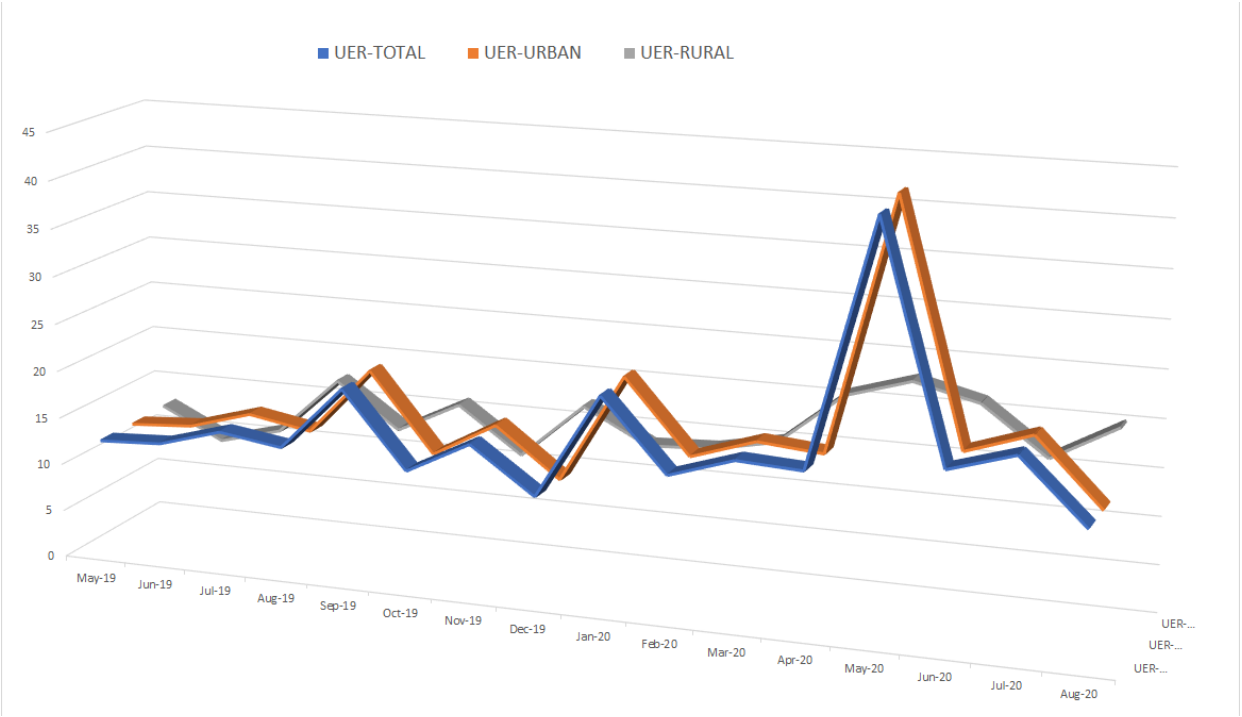


Figure 20: *Plot of total, urban and rural unemployment rates over the time period considered*

Analysis of the data leads to the deduction that unemployment rates have seen an increase after the nationwide lockdown was implemented in march 2020. During april and may 2020, we observe a very high peak in the graph as these were the periods of lockdown wherein most activities were suspended. Reasons for the increase in unemployment rates include damage to the economy, losses, cost-cutting, suspension of businesses and other activities as well as health hazards. As this strict lockdown was relaxed, we see a decrease in the unemployment rate and the rate of increase is stabilised as it was before the march-april-may lockdown period. June, july and august 2020 show a reduction in the unemployment rates compared to the previous months.
In rural areas, however, the rate, although is at a quite high level, is not as high as in urban areas. The same is even observed in the pre COVID-19 months. This arises due to lack of opportunities, jobs and other employment opportunities in rural areas that have persisted for long.

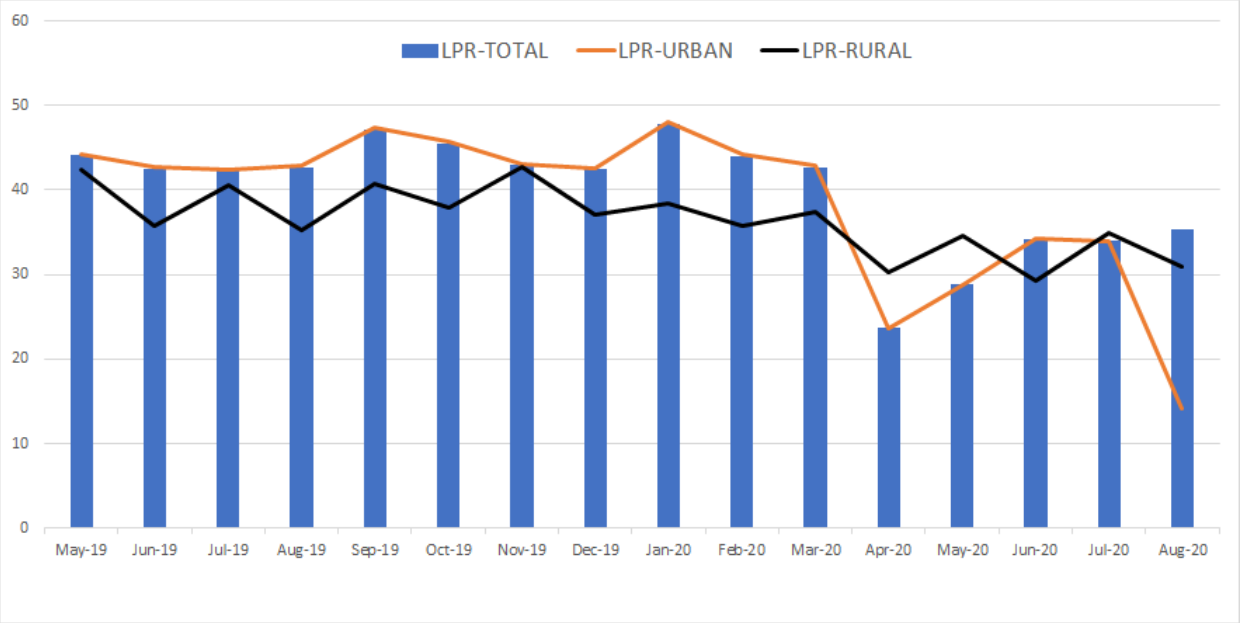


Figure 21: *Plot of total, urban and rural labour participation rates over the time period considered*

Labour participation rates, as observed, witnessed a big drop during the months of April and May 2020. This observation goes in hand with the similar observed peak in unemployment rates in the same time period. This was again the period of strict lockdown, wherein individuals lost jobs and business were shut due to losses and there was less participation due to health hazards and staying at home norms. Delhi also faced the issue of migration of labourers during the same time period wherein migrant labourers assembled in huge numbers to return to their hometowns in UP and Bihar via Delhi. In the consequent months, however, as the lockdown was eased and restrictions were lifted, the LPR saw some increase, although not a considerable amount and even lesser in rural areas.

3.2 TRANSPORT SECTOR

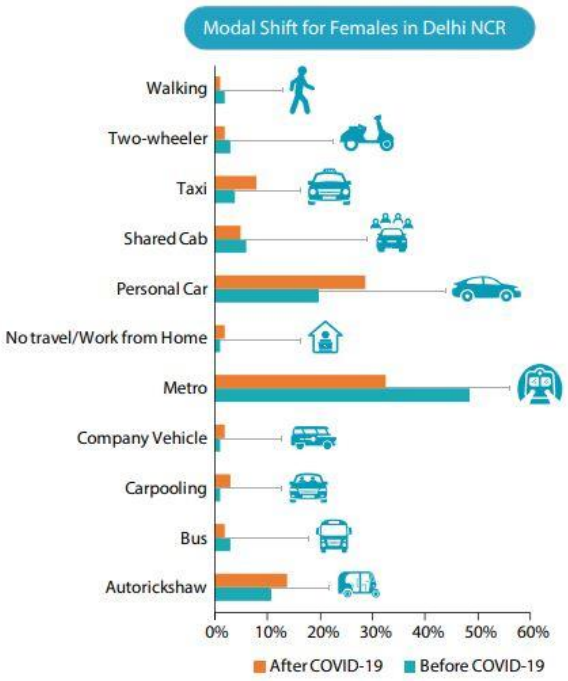


Figure 22. *Stated modal shift in Delhi-NCR for female respondents*[9]

Before the onset of COVID-19 pandemic, 50 per cent of the total female respondents were metro users. This share is stated to decline to 34 per cent post-COVID-19. Moreover, it is observed that there will be a 9 per cent increase in the share of women using personal cars. The share in the usage of auto rickshaws and taxis is also observed to increase by 3 percent and 4 per cent respectively, by women commuters.

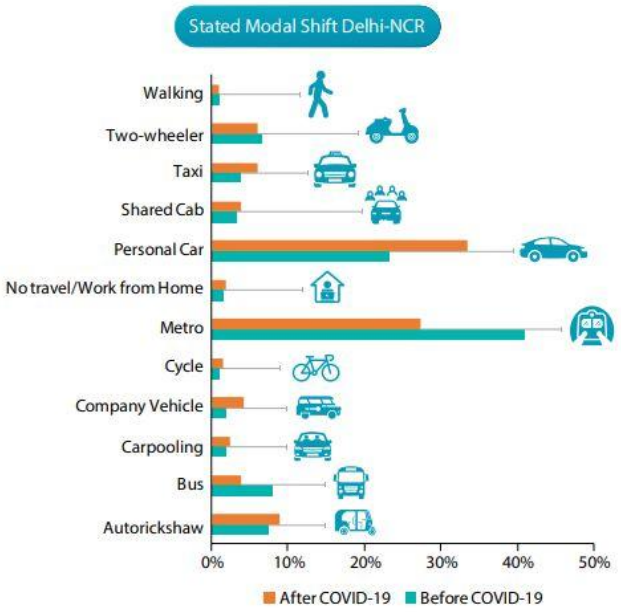


Figure 23: *Stated modal shift for Delhi NCR*[9]

As per the survey, there will be a decrease of 13 per cent and 4 per cent in the stated share of metro and bus users, respectively, with almost all the users shifting to personal vehicles. Minor increase of 1 per cent and 2 per cent is also observed in the share of intermediate public transport services of auto rickshaw and taxis, respectively.

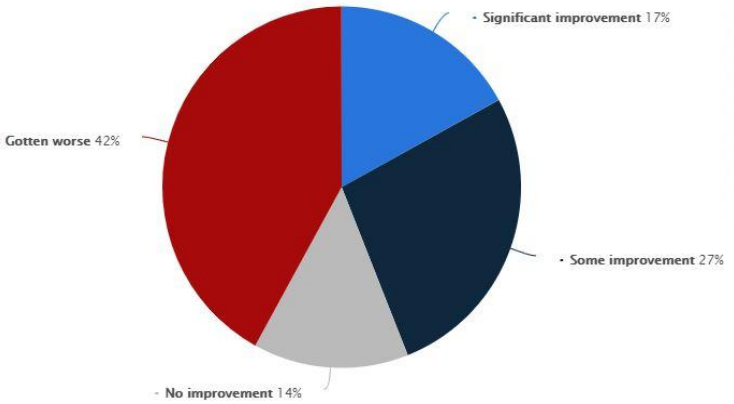


Figure 24. *Improvement in bus transportation services in Delhi, January 2020*[10]

According to a survey regarding the performance of Delhi government as of January 2020, 42 percent of respondents from the capital felt that the bus transportation services had become worse in the last five years. Whereas, 44 percent of the respondents felt that bus services in the city had either some or significant improvements in the recent years.

3.3 HEALTHCARE SECTOR

Let us consider a pharmaceutical company to understand how the trend was pre COVID times.

Jubilant Life Sciences Ltd is a pharmaceutical company that develops, manufactures, sells and distributes a wide range of products and offers numerous manufacturing services[16].

These are the stock prices graph of the company throughout its lifetime. Considering 2014-2020, we can see the rise of the company and a fall during the COVID crisis and an increase once more. It is evident that pharmaceuticals were doing big pre COVID. The dip in the graph during the onset of the pandemic is a common trend seen among all sectors.

Figure 25: *Stock prices graph of Jubilant Life Sciences Ltd*[17]

The revenue of the company for the year 2019 was estimated to ₹2,181.86 crore.[18]
The revenue of the company till June 30 2020 is seen as ₹1,892.92 crore.[18]

It is clearly seen that there is a rise in sales for this pharmaceutical company and the revenue will surpass the previous years revenue with the demand for the sector.

During COVID times, their stock price on 10 Aug 2020 with highest cases of COVID-9, being at its peak. We can clearly see the upward trend in the graph for the company during COVID times. As a result, pharmaceutical companies as a sub division and healthcare as a whole has seen a rise in demand. (Figure 26)

Figure 26: *Past 1 year stock prices graph of Jubilant Life Sciences Ltd.*[17]

Chapter 4: Discussions

The situation of COVID-19 pandemic has brought about a change in all our lives. Hence, on a national or regional level, there are various issues to be tackled. Recovering from losses or lost jobs during this period alongside following the health norms and avoiding health hazards in order to cater to customers and achieve targets like before can be very challenging. Around 20 lakh people have lost employment and an equal number are staring at job losses as private bus and tourist taxi operators have been hit hard by the coronavirus lockdown, according to the Bus & Car Operators Confederation of India (BOCI).

A variety of measures have been brought about by the state as well as the central government for the same. The domestic road transport sector is likely to contract by up to 20 per cent on account of COVID-19 pandemic-induced challenges, according to rating agency ICRA. With gradual easing of lockdown limitations, railways and seaways freight volumes have revived to 85-90 per cent of pre-COVID levels in June 2020. Some of the state government's notable initiatives towards curbing the spread of the virus include:

1. Passing an order whereby all private hospitals with more than 50 beds had to reserve 40% of beds for treating COVID patients. This increased the number of COVID beds in private hospitals from 700 to 5000 and also made COVID facilities available in all parts of the state. Additionally, hotels were linked to private hospitals, thereby increasing the bed capacity of hospitals from 5000 to 7000. Today, there are over 15,000 COVID beds in Delhi.
2. The Kejriwal government became the first in the country to launch 'Delhi Corona App' that displayed real-time availability of beds in every hospital of the city.
3. By setting up the first plasma bank in the country, the government ensured that patients can easily access convalescent plasma.
4. In July this year, CM Arvind Kejriwal launched an online portal-- jobs.delhi.gov.in to serve as a "Rozgar Bazaar" for recruiters and job aspirants and appealed to traders, businessmen and industrialists to join hands to work for the betterment of the state's economy.

Apart from this, air pollution has shown an interesting trend in the state during periods of lockdown and afterwards. Earlier this year in March, after the enforcement of the strict lockdown, as a result of reduced vehicular movement, Delhi witnessed a dramatic improvement in air quality, clear blue skies as well a low Air Quality Index of 69. However as lockdown was eased and life was getting restored to the old normal, the air pollution in the state shot up by multiple points. First week of November recorded high levels of Air Quality Index, going up to 469 points making the state very "severe". CM Kejriwal issued a statement on 5th november acknowledging the deterioration of the COVID-19 situation as a result of alarming air pollution levels and assured that the government will take necessary actions to curb the same while pleading to the public to avoid usage of firecrackers in the upcoming festivities and enforcing a strict punishment for the same.

While Delhi still continues to be one of the most affected states with respect to COVID-19, several measures taken up by the government as well as a decreasing trend in the number of cases across the nation indicate that the situation might improve for the better in the coming months.

Chapter 5: Conclusions

COVID-19 pandemic did not just change the norms of living, working or moving around, it also brought about challenges to present governments that they have had little or no past experience dealing with. Major sectors of the state were hit hard due to the pandemic and measures taken for it.
The study at hand reveals surprising levels of changes, peaks or drops during lockdown periods as compared to after and before lockdown periods. Unemployment touched a high peak as the state went into a strict lockdown and at the same time labour participation dropped very low during the same period.

The rapid rise of COVID-19 pandemic and subsequent restrictive measures implemented by the central and state governments to contain the disease have adversely impacted the prospects of the Indian logistics sector, especially the road freight transportation movement, according to ICRA, a rating agency..In addition to the impact on the road logistics sector, the macro-economic slowdown and evolving COVID-19 situation also had a bearing on rail and seaway freight traffic, with freight volumes contracting by 21.3 per cent and 19.7 per cent y-o-y, respectively.

The healthcare sector plays a huge role during the pandemic. This sector in Delhi is seen to be well developed and contributes largely to Delhi's economy. That being said it also caters to a certain portion of people with a range of privileges. Due to the pandemic there is an increase in need for resources and medicines. As a result this result is seen to be flourishing due to high demand. It also faces multiple challenges such as need for more certified practitioners and medical equipment. Thus, the state of Delhi has an evolving healthcare sector but it has not yet reached its full potential.

While each sector faces different challenges as a result of the pandemic, it is vital that the government addresses different sectors with initiatives and provisions that help revive the state's economy. Primary focus on the healthcare sector with initiatives to cater to the curbing of the virus has seen good results. However, sectors such as tourism, employment, transport, manufacturing industries, etc still face a hard time as a result of being hit with one of the most alarming health hazards of all time. While government initiatives exist, they are minimal and have done little to bring about any revival of the economy of the state. With a relatively lower number of cases showing up recently, the country hopes for a recovery of the nation and its states.

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