Spread of Novel Coronavirus(nCov) & Deaths due to COVID-19 :

by Asad Haidar

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Major Research Report
On
Spread of Novel Coronavirus(nCov) & Deaths due to COVID-19 : Effect of Movement of migrant workers and Dependency upon Health Infrastructure

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MAY 2020

CERTIFICATE

This is to certify that, Asad Haider (2K18/MBA/710) and Parth Gupta (2K18/MBA/712) students of MBA (General) have successfully completed the project entitled, "Spread of Novel Coronavirus(nCov) & Deaths due COVID-19 : Effect of Movement of migrant workers and Dependency upon Health Infrastructure" under the guidance of our mentor Dr. Jagvinder Singh, Assistant Professor, USME, DTU in the year 2020 in partial fulfillment of end semester examination conducted at the University School of Management and Entrepreneurship,
New Delhi – 110095.

Dr. Jagvinder Singh **Date:**
Assistant Professor
University School of Management and Entrepreneurship
Delhi Technological University
New Delhi – 110095

DECLARATION

We hereby declare that research project submission represents our own ideas & in our words & where other's ideas or words have been included, have adequately cited and referenced to the original sources. We also declare that we have adhered to all principles of academic honesty and integrity in our submission. Also, it is certified that the project is not submitted earlier elsewhere.

Asad Haider (2K18/MBA/710) Date:

Parth Gupta (2K18/MBA/712) Date:

This research project has been submitted for examination with my approval as the University mentor/supervisor.

Dr. Jagvinder Singh Date:
Assistant Professor
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Asad Haider (2K18/MBA/710) **Date:**

Parth Gupta (2K18/MBA/712) **Date:**

EXECUTIVE SUMMARY

This study is done in order to find out whether the movement of Migrant workers will affect the spread of Novel Coronavirus as the first case was reported on January 30th, 2020 in the state of Kerala after the return of a student from China. So it is evident that the virus came from a different country and did not originate in India therefore the virus spread in the country through people returning from abroad and coming in contact with people in India. The migrant workers came in contact with these people as the latter is the employer of many of them in many cases before the Government implemented lockdown and thus increasing the danger of spread of nCov among migrant workers which in turn travelled to their native places, risking it even further towards the spread of virus in interior parts of the country. Further the study finds out the dependency of deaths due to COVID-19 upon the health infrastructure. In the research the primary data is collected through the routine Press briefing of the Ministry of Health and family Welfare(MoHFW) which has been collected and compiled from the summary submitted to the ministry by hospitals throughout India. For the number of COVID-19 cases for Germany, India, United states, United Kingdom, Italy, France, Spain, Germany reports from the World Health Organisation were considered as primary sources. Descriptive Research method is used in this project study. The study will enable us to identify the significant impact of the movement of migrant workers and dependency upon the health infrastructure and help identify the factors and solutions to contain the spread of Novel Coronavirus(nCov).

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CHAPTER 1 : INTRODUCTION

1.1 EPIDEMIC

"An epidemic is the quick spread of the ailment to enormous quantities of individuals in a given populace in a brief timeframe." For instance, in meningococcal contaminations, an assault rate more prominent than 15 cases for every 100,000 individuals for two sequential weeks is viewed as an epidemic. "[1]

"Irresistible illness flare-ups are by and large brought about by a few elements, remembering a change for the biology of the host populace (eg, expanded pressure or an expansion in the thickness of a vector animal varieties), a hereditary change in the pathogen store or the presentation of a developing pathogen into a host populace (by development of the pathogen or host.) as a rule, a pandemic happens when the host's insusceptibility to a built up pathogen or another rising pathogen out of nowhere dips under that it is in endemic harmony and the transmission limit is surpassed. "

1.1.1 Causes

A few changes can happen in an irresistible individual and trigger an epidemic. These consist of :

- The increased ability of an agent of infection to produce disease.
- Introduction of a novel virus.
- Host susceptibility changes towards the pathogens.

1.1.2 Types

- Outbreak which happens through a common source
- Outbreak which are propagated.

1.1.3 Transmission

- Transmission via air: Transmission via air is the spread of contamination via airborne bead cores or residue. Without the mediation of winds or drafts, the separation over which the contamination happens noticeable all around is short.
- "Arthropod transmission: Arthropod transmission is completed by a creepy crawly, either precisely through a tainted cylinder or feet, or naturally when there is development or replication of a living being in the arthropod".
- Organic transmission: includes a natural procedure, for instance, the entry from a phase of improvement of the irresistible operator to a middle of the road before the mechanical transmission.
- Transmission by contact: the pathogen is moved straightforwardly by gnawing, sucking, biting or in a roundabout way by breathing in drops, drinking polluted water, going in tainted vehicles.
- Cyclopropagative transmission: the operator experiences improvement and augmentation in the transmitting vehicle.
- Formative transmission: the operator is encountering some improvement in the transmission vehicle.
- Fecal-oral transmission: the irresistible operator is dispensed with by the tainted host in the excrement and gained by the defenseless host by ingestion of defiled material.

1.1.4 Few Examples Of Epidemics

- Black Death (14th Century)

Fig 1.1 ; Source: History.Com

- Cocoliztli Epidemic (16th Century)

Fig 1.2 ; Source: Wikipedia

- American Plagues (16th Century)

Fig 1.3 ; Source : Listverse.Com

- American Polio Epidemic (Starting 20th Century)

Fig 1.4 ; Source : Qz.Com

- Spanish Flu (Starting 20th Century)

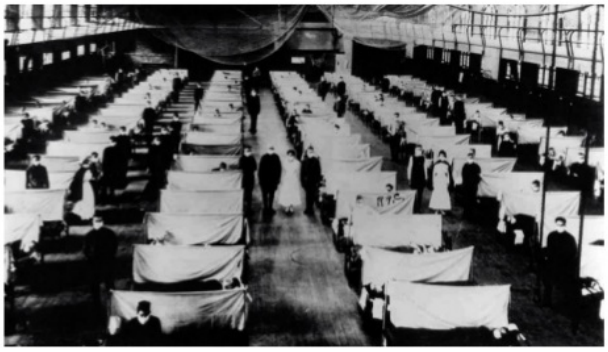

Fig 1.5 ; Source : Bbc

- Asian Flu (Mid 20th Century)

Fig 1.6 ; Source : Wnyc.Org

- A.I.D.S.

Fig 1.7 ; Source : Nbc News

- H1n1 Swine (2009 - Present)

Fig 1.8 ; Source : Livescience.Com

- West African Ebola (2014 To Present)

Fig 1.9 ; Source : Worldvision.Org

- Zika Virus (2015 To Present)

Fig 1.10 ; Source : The Hindu

1.2 Pandemic

A Pandemic is a pestilence of illness which spreads to a large area, for instance a few mainlands or even may be around the world, influencing a significant number of individuals. a far reaching endemic ailment which has a steady number of contaminated individuals is definitely not a pandemic. endemic maladies predominant which have a steady number of individuals affected, for example, repetitive occasional influenza, are by and large rejected, as they happen at the same time in large parts of the world as opposed to spreading around the world.

1.2.1 List Of Few Pandemics

- Influenza

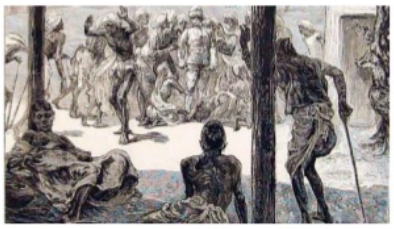

Fig 1.11 ; Source : Dna India

- Smallpox

Fig 1.12 ; Source : Thepatriot.In

- Measles

Fig 1.13 ; Source : The Hindu

- Tuberculosis

Fig 1.14 ; Source : Caravanmagzine.In

- Covid-19

Fig 1.15 ; Source : Weather.Com

- Cholera

Fig 1.16 ; Source : Wikipedia

- Leprosy

Fig 1.17 ; Source : Scroll.In

- Malaria

Fig 1.18 ; Source : Weather.Com

- Yellow Fever

Fig 1.19 ; Source : Passporthealthusa.Com

1.3 DIFFERENCE BETWEEN EPIDEMIC & PANDEMIC

However, as far as pandemic versus epidemic, the primary term is utilized to portray an ailment that influences a whole country or even the world in general. Therefore,the contrast between a pandemic and an epidemic is that regardless of whether a plague can just influence at least one area, a pandemic influences the entire world.

1.4 WHEN DOES AN EPIDEMIC BECOME A PANDEMIC?

An epidemic turns into a pandemic when it has spread to an enormous geographic territory and when it starts to influence a huge level of people. At the end of the day, the contrast among pandemics and epidemics is that a pandemic is a plague that has influenced most by far a nation or the world. Pandemics influence more individuals and are regularly brought about by new infections or ailments that have not been around for a considerable length of time, if not hundreds of years. Another contrast among pestilences and pandemics is that most people have almost no resistance to the new ailment. Pandemics are likewise known to cause a bigger number of casualties than epidemics. At long last, another significant attribute of an epidemic contrasted with a pandemic is that a pandemic frequently additionally creates components, for example, social disturbance and/or financial misfortune.

1.5 COVID 19

Coronavirus affliction (COVID-19) is a powerful contamination realized by a newly discovered disease known as Novel coronavirus (nCOV).

A considerable number individuals who have been infected with Novel Coronavirus(nCov) will experience low to medium symptoms and can recover with right medical attention.

1.5.1 How It Spreads

"The virus that causes COVID-19 is transmitted mainly by droplets generated when an infected person sneezes, coughs, or expires. The density of these drops is too high to hang in the air and fall quickly on floors or surfaces".

You can become infected by breathing the virus, by working with someone with COVID-19, or by touching a contaminated surface.

1.5.2 Symptoms

Regular occurring symptoms are:

- Dry Cough
- Fever.
- Tiredness.

A few people may likewise show following symptoms:

- A throbbing painfulness.
- Nasal blockage.
- Runny nose.
- Sore throat.
- Diarrhoea.

Usually it takes 5-6 days for the manifestations to appear after the individual is infected. However it can take as long as 14 days. Individuals with mellow manifestations who are in any case sound are encouraged to self-disconnect themselves and look for clinical

consideration if there should arise an occurrence of having fever, cough and trouble relaxing.

1.5.3 Treatment

Till date, there are no specific inoculations or medicines for COVID-19. Medications are under scrutiny, and will be tried through clinical preliminaries.

1.5.4 Self-care & Prevention

On the off chance that you feel wiped out you should take rest, drink a lot of water, and eat nutritious nourishment. Remain in a different room from other relatives, and utilize a committed washroom if conceivable. Clean and sterilize habitually contacted surfaces. Everybody should attempt to keep a sound way of life at home. Keep up a sound eating routine, enough rest, remain dynamic, and reach through the telephone or web. Keep to ordinary schedules and timetables however much as could reasonably be expected.
It is entirely expected to feel pitiful, pushed, or confounded during an emergency. Conversing with individuals you are generally associated with, for example, loved ones, can help. In the event that you feel overpowered, converse with a health worker or counsellor.

1.6 ACTIONS TAKEN AROUND THE WORLD TO COMBAT COVID-19

1.6.1 1 Travel

The main step taken by the worldwide network was to seal border and suspend global flights, trailed by restrictions on interior mobility.

India, in the interim, has shut border doors and cut global flights, while going inside the nation is currently just conceivable if individuals have authorization from the common representative's workplaces. Travel to or from more than 40 regions has been suspended.

Different nations that shut their border and took interior measures. Many nations have shut their doors to international flights, however have not forced exacting measures upon domestic travel.

Concerning the United Kingdom, Ireland and Germany, they have taken no measures against the movement of people.

1.6.2 2 Actions to reduce mass mobility

India, Spain, and Italy have declared a check in time, while the UK, Ireland and China have favored fewer restrictions. Many countries have not forced curfews , yet requested that the residents remain at home.

Measures, for example, shutting outskirts, curfews, transportation and travel limitations have intruded on day by day life and business exercises. Governments around the globe have embraced measures to help workers and managers, who have been adversely influenced by the pandemic.

1.6.3 3 Measures for professional life

India made commitments to annuity assets to support poor people. India has introduced a package of 20 lakh crore to support its medium, small and micro industries. Spain, Italy, France, Germany and Brazil have additionally embraced measures to shield laborers from joblessness.

Turkish, British and Russian specialists have made annuities accessible to the older who are at larger risk of getting a coronavirus.

1.6.4 4 Actions in Health facilities and the Health System

The spread of the infection has put an overwhelming weight on health infrastructure in the most affected nations and supplies of health gear and medications have begun to lessen. They experienced issues in giving fundamental defensive gear, for example, covers and gloves, just as test packs and treatment administrations.

The nations with the most affirmed cases offer free COVID-19 tests, except for Brazil and the Netherlands. Treatment for the infection is offered for nothing out of pocket in all nations with the exception of the Netherlands.

The United States mostly takes care of the handling costs, while Iran charges people 10% of the complete expense.

India, the United States, Germany, China, Russia, Brazil, Switzerland and Austria have no issue getting to personal protection gear packs, which isn't the situation for others.

In the United States, clinic bed limits don't address the issues of the United States, Spain, the United Kingdom, China, Belgium and India; also, seven nations want to expand the quantity of escalated care units and another 15 need drugs.

1.6.5 5 International solidarity & Evacuation operations

In light of calls from expats, numerous nations have taken measures to clear their residents living abroad.

“Up until this point, the nation evacuation figures are as per the following: United States 63,000; Spain 24,000; Italy 60,000; France 148,000; Germany 240,000; the United Kingdom 7,500; China 1,457; Belgium 6,000; Brazil 13,000; Russia 150,000; Canada 5,000; Netherlands 5,000; Switzerland 2,700; Portugal 7,500; Austria 7,500; India 125,000 and Ireland 250.”[2]

China has stretched out assistance to 120 nations, while the United States disseminated clinical supplies to more than 40 nations. India has helped 31 nations and Russia has bolstered 10 nations.

1.6.6 6 Economic measures

Individuals and organizations are presently ready to cover annual assessment and corporate expenses sometime in the near future and the undertakings generally

influenced by the pandemic will have the option to pay their worth included duty and installment of premiums three months after the ease of lockdown.

Except for Brazil, Switzerland, and Israel, the entirety of the nations with most noteworthy affirmed cases made it simpler for the private part to delay the installment of their charges. Seriously influenced organizations were furnished with subsidizing, credits, and financing. Along with India, some different nations to give credit backing to organizations were Spain, France, Germany, China, Iran, Russia, the Netherlands, Switzerland, and Turkey.

1.7 RESEARCH OBJECTIVE

Research is done to find out the factors which are affecting the spread of Novel Coronavirus(nCov) and the deaths due to COVID-19 disease.

- To determine whether the gatherings and movement of migrant workers affect the spread of Novel Coronavirus.
- To determine whether the number of deaths due to COVID-19 in India is due to failure of India's Health Infrastructure compared to developed nations.

1.8 HYPOTHESIS

- Objective 1 : To know the effect of gatherings and movement of migrant workers upon the spread of Novel Coronavirus(nCov) , the following null and alternate hypothesis has been framed:

Null Hypothesis is denoted by H0 whereas Alternative Hypothesis is denoted by H1.

- H0: No significant effect of gathering and movement of migrant workers upon spread of Novel Coronavirus(nCov).
- H1: There is a significant impact of gathering and movement of migrant workers upon the spread of Novel Coronavirus(nCov).

- Objective 2 : To determine whether the number of deaths due to COVID-19 in India is due to failure of India's Health Infrastructure compared to developed nations, the following null and alternate hypothesis has been framed:

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Null Hypothesis is denoted by H0 whereas Alternative Hypothesis is denoted by H1.

- H_A0: Deaths in India due to COVID-19 do not depend upon the health infrastructure.
- H_A1: Deaths in India Due to COVID-19 are because of the weak health infrastructure of India.

- H_B0: India's health infrastructure is not affected by COVID-19 pandamic.
- H_B1: India's health infrastructure is affected by COVID-19 pandamic.

CHAPTER 2: REVIEW OF LITERATURE

Fig 1.20 ; Source : Google (as reported on May 10th, 2020)

2.1 Measures taken by India Amid COVID-19

- Complete lockdown from Midnight of March 25th, 2020 has been implemented uptill date with announcement of extension lockdown from May18th, 2020 till further notice.
- Package worth 20 lakh crore has been introduced to fight COVID-19 pandemic.
- The Government created the Aarogya Setu application to spread awareness about coronavirus.
- Poor families that utilize 5 kg gas cylinders for cooking will be qualified for eight free tops off in a quarter of a year, because of the Covid-19 Lockdown. The quantity of free tops off will be restricted to three for recipients utilizing 14.2 kg chambers.

- The Government plans to come up with a chain of retail locations called 'Suraksha stores' throughout India, which will give basics to residents while keeping up severe security norms, the PTI news office detailed.
- The Union's Minister of Human Resources Development, Ramesh Pokhriyal, propelled an online interface to screen and record the service's drive to battle Covid-19 with Knowledge, Technology and Innovation (YUKTI).
- Through the Ujjawala scheme, the Government will give topup of LPG throughout the following three months to more than 8.3 million poor ladies.
- The Ministry of Finance reported that it will do a quick revival of Rs. Rs 18 billion in tax refunds to people and organizations.
- The administration chose to two fold the measure of the unsecured credit for ladies in NGO's to Rs 20 lakh.
- As indicated by the PM-KISAN scheme, the fund service said that in excess of 6 crore farmers have profited in the midst of the conclusion. R 13,855 crore was apportioned for the installment of the principal portion of PM-KISAN.
- A raise in wages through MGNREGA will be Rs 202 from Rs 182. The measure would bring Rs 2,000 in addition to laborers.
- FM Nirmala Sitharaman reported a package worth Rs 1.70 lakh crore provided by the Government.

2.2 .2 Medical Infrastructure in India

"Notwithstanding the way that the amount of COVID-19 cases are still low in India, experts have forewarned against organized spread of the ailment which will incite quick and gigantic additional mainstream for Health workplaces. Private social protection is expensive and difficult to reach for some poor nuclear families in India which leaves open human administrations workplaces as the primary available decision for them. For patients who are viewed as COVID-19 positive, detachment wards are required;

besides, for essential cases, raised consideration is required. By and by, for all intents and purposes completely connected cases with coronavirus are suggested by government crisis centers and it's basic to assess where we stay similar to clinical capacity to give significant social protection to the impacted individuals."[3]

"In this piece we revolve around availability of government crisis facility beds for huge states in India. Using data from National Health Profile – 2019, it has been seen that there are 7,13,986 supreme government clinical center beds open in India. This indicates 0.55 beds per 1000 masses. The old people (developed at least 60) are especially defenseless, given more bothers which are represented patients in this age gathering. The openness of beds for older masses in India is 5.18 beds per 1000 people." [4]

"It was in like manner seen that various states lie underneath the national level figure (0.55 beds per 1000 masses), these join Bihar, Jharkhand, Gujarat, Uttar Pradesh, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Haryana, Maharashtra, Odisha, Assam and Manipur. These 12 states together record for close to 70% of the hard and fast masses in India. Bihar has an exceptional absence of government facility beds with just 0.11 beds open per 1000 masses. A couple of states enhance this measurement, for instance, West Bengal (2.25 government beds per 1000) and Sikkim (2.34 government beds per 1000). The capital city of Delhi has 1.05 beds per 1000 masses and the southern states of Kerala (1.05 beds per 1000) and Tamil Nadu (1.1 beds per 1000) moreover have better openness of beds. The circumstance is extremely equivalent when the assessment is cultivated for essentially the old masses: Northeastern states show improvement over others; southern states moreover have higher number of beds open for old people - for example, Kerala (7.4), Tamil Nadu(7.8), Karnatak(8.6) - while northern and central states have modestly low openness of government beds for more seasoned masses."[5]

'The availability of government beds is horrifyingly low in India, and a scourge like coronavirus can quickly befuddle the issue impressively further. A normal 5-10% of hard

and fast patients will require essential thought as ventilator support. In a most desperate result possible, according to one measure regardless, we may end up with 2.2 million cases in India by May 15, which gathers that we will require 110,000 to 220,000 ventilators."[6]

"There are no official figures on the amount of ventilators available in the open region, nevertheless, we appear at a normal figure using the amount of crisis facility beds open - 7,13,986 complete government beds, out of which 5-8% are ICU beds (35,699 to 57,119 ICU beds). Tolerating that half of these ICU beds have ventilators, there is a check of 17,850 to 25,556 ventilators in the country. To be sure, even in the best circumstance where all ICU beds are outfitted with ventilators, there is a constraint of ~ 57k ventilators to oblige a creating number of COVID-19 patients."[7]

Plainly, the developing interest for ventilators will overwhelm the constrained flexibly actually soon.

While request is being held somewhere around conduct mediations, for example, social distancing and so on, number of beds and basic consideration hardware like ventilators should be immediately increased. In such a manner, the legislature has just restricted the fare of basic consideration of medical hardware. Moreover, over abundance limit in private medicinal services can be deliberately utilized by the government and crisis plans of setting up emergency clinic beds in armed force camps ought to be executed as quickly as time permits.

CHAPTER 3: RESEARCH METHODOLOGY

Type of study	Descriptive
Type of Sampling	Random Sampling
Sample Size 1 Sample size 2	54 7
Tools used for analysis	SPSS (Statistical Package for Social Sciences) & Advanced MS-Excel

Table 3.1

3.1 Sampling and Data Source

Objective 1:

The Secondary data has been collected from the routine Press briefing of the Ministry of Health and family Welfare(MoHFW) which has been collected and compiled from the summary submitted to the ministry by hospitals throughout India.[8]

The data of the number of confirmed cases was further divided into three sets based on the two incidents related to gatherings and movement of migrant workers.

The following Cases which are taken into consideration:

- Case 1 : Before any incident of gathering took place and lockdown was implemented.

Date	Case	Number of Patients	Increase in patients
March 10th	1	50*	50*

March11 th	1	60	10
March 12th	1	73	13
March 13th	1	81	8
March 14th	1	97	16
March 15th	1	107	10
March 16th	1	118	11
March 17th	1	137	19
March 18th	1	151	14
March 19th	1	173	22
March 20th	1	223	50
March 21st	1	283	60
March 22nd	1	360	77
March 23rd	1	434	74
March 24th	1	519	85
March 25th	1	606	87
March 26th	1	694	88
March 27th	1	834	140

Table 3.2

*This is cumulative Data up till March 10th, 2020

- Case 2 : After the incident 1 : on March 28th, 2020

  Thousands of Migrant Workers gathered at Anand Vihar Railway Station and Bus stop, New Delhi to move back to their respective native places though the country was in a state of complete lockdown. Similar incidents were reported

throughout India. The state of Delhi and Uttar Pradesh had to arrange buses to take migrants back home.

28 March	2	918	84
29 March	2	1024	106
30 March	2	1251	227
31 March	2	1397	146
1 April	2	1834	437
2 April	2	2069	235
3 April	2	2547	478
4 April	2	3072	525
5 April	2	3577	505
6 April	2	4281	704
7 April	2	4789	508
8 April	2	5274	485
9 April	2	5865	591
10 April	2	6761	896
11 April	2	7529	768
12 April	2	8447	918
13 April	2	9352	905
14 April	2	10815	1463

Table 3.3

- Case 3 : After Incident 2 : on April 14th, 2020

  A rumour spread like a wildfire that the lockdown will end on the eve of April 14th and trains will be scheduled for migrants to move back home. Thousands of

migrant workers gathered at various railway stations and bus stops throughout the state of Maharashtra, Gujarat and Rajasthan which in turn were let down and majority of them started moving towards their native places on foot, bicycle.

15 April	3	11933	1118
16 April	3	12759	826
17 April	3	13835	1076
18 April	3	14792	957
19 April	3	16116	1324
20 April	3	17656	1540
21 April	3	18985	1329
22 April	3	20471	1486
23 April	3	21700	1229
24 April	3	23452	1752
25 April	3	24942	1490
26 April	3	26917	1975
27 April	3	28380	1463
28 April	3	29974	1594
29 April	3	31787	1813
30 April	3	33610	1823
1 May	3	35365	1755
2 May	3	37336	1971

Table 3.4

Objective 2 :

For the number of COVID-19 cases for the United states, Italy, France, Spain, United Kingdom, Germany, India reports from the World Health Organisation were considered as secondary sources.[9]

Country	Observed Value Patients Under Treatment/ Recovered*	Deaths*	Total Infected*
United States	1.194361	0.075639	1.27
Italy	0.184042	0.029958	0.214
France	0.082973	0.055027	0.138
Spain	0.19493	0.02607	0.221
United Kingdom	0.176385	0.030615	0.207
Germany	0.161656	0.007344	0.169
India	0.051258	0.001787	0.053045

Table 3.5

*** Values Taken Per Million**

3.2 Research Design

Research design precisely depict a populace or a circumstance. It is utilized to give answers to questions like what, when, where, when and how, however is inadequate in replying to the inquiry why. We have utilized descriptive study structure.

The Descriptive study should be possible by two different ways:

➢ Survey Method: - It is a technique through which singular units are contemplated. A survey is made which is skimmed to the respondents.

➢ Observation Method: - The conduct of the respondent is seen by the scientist or a researcher.

Observation method has been used in the project.

- One way Anova

  One way anova denotes one way analysis of variance which is a technique used to compare the mean between two samples or more. One way Anova can only be used for numerical value

  Here, One way Anova is used as there are three sets of data, thus f-test is preferred.

- ChiSquare Test

  "A **chi-square** (χ^2) **statistic** is a non-parametric test that measures how expectations compare to actual observed data (or model results). The data used in calculating a chi-square statistic must be random, raw, mutually exclusive, drawn from independent variables, and drawn from a large enough sample."[10]

  $$\chi 2 = \sum (O - E)^2 / E$$

  Where,

  O = Observed Value,

  E= Expected Value

  The formula for expected value is,

  $$E = (RT * CT) / N$$

  Where,

  RT= Row Total

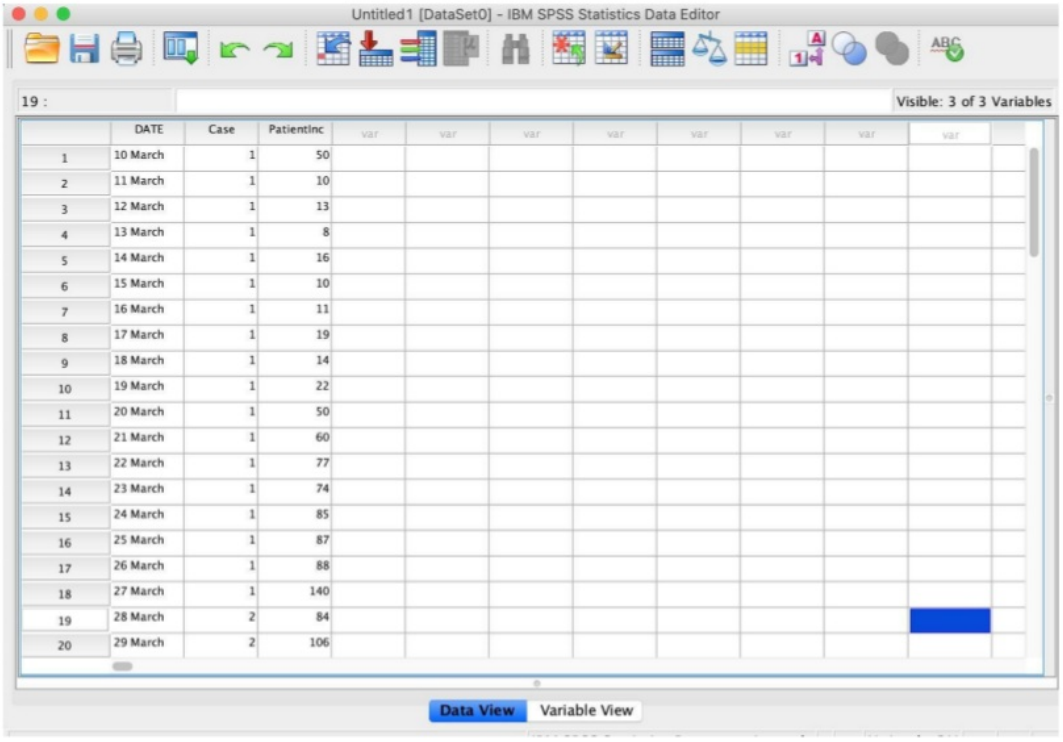
  CT= Column Total

  N= Total Number of observation

CHAPTER 4 : DATA ANALYSIS, FINDINGS AND RESULT

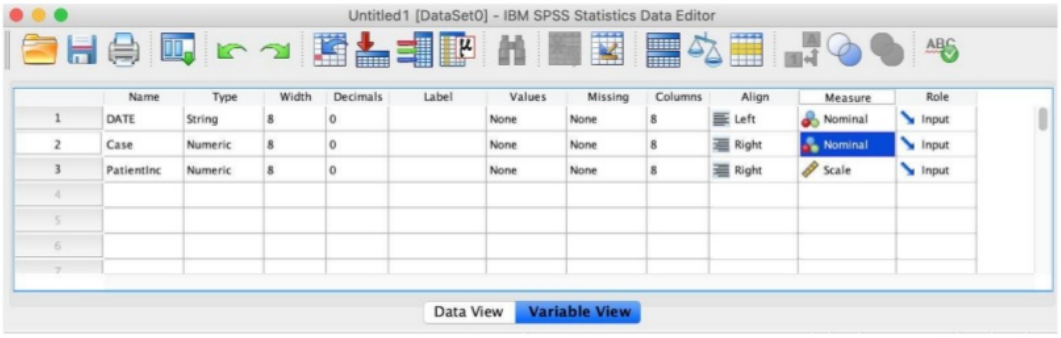
OBJECTIVE 1 : EFFECT OF MOVEMENT OF MIGRANT WORKERS ON SPREAD OF NOVEL CORONAVIRUS(nCov)

- One Way Anova



	DATE	Case	PatientInc
1	10 March	1	50
2	11 March	1	10
3	12 March	1	13
4	13 March	1	8
5	14 March	1	16
6	15 March	1	10
7	16 March	1	11
8	17 March	1	19
9	18 March	1	14
10	19 March	1	22
11	20 March	1	50
12	21 March	1	60
13	22 March	1	77
14	23 March	1	74
15	24 March	1	85
16	25 March	1	87
17	26 March	1	88
18	27 March	1	140
19	28 March	2	84
20	29 March	2	106

Table 4.1



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	DATE	String	8	0		None	None	8	Left	Nominal	Input
2	Case	Numeric	8	0		None	None	8	Right	Nominal	Input
3	PatientInc	Numeric	8	0		None	None	8	Right	Scale	Input

Table 4.2

	Case 1	Case 2	Case 3
	50	84	1118
	10	106	826
	13	227	1076
	8	146	957
	16	437	1324
	10	235	1540
	11	478	1329
	19	525	1486
	14	505	1229
	22	704	1752
	50	508	1490
	60	485	1975
	77	591	1463
	74	896	1594
	85	768	1813
	87	918	1823
	88	905	1755
	140	1463	1971
TOTAL	834	9981	26521

Table 4.3

	$\bar{x}-\bar{x}1$	$(\bar{x}-\bar{x}1)^2$	$\bar{x}-\bar{x}2$	$(\bar{x}-\bar{x}2)^2$	$\bar{x}-\bar{x}3$	$(\bar{x}-\bar{x}3)^2$
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374

	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
	645.0740741	416120.561	136.9074074	18743.6382	-781.9814815	611495.0374
TOTAL		7490170.099		337385.4877		11006910.67

Table 4.4

	a-x̄1	(a-x̄1)^2	b-x̄2	(b-x̄2)^2	c-x̄3	(c-x̄3)^2
	3.666666667	13.44444444	-470.5	221370.25	-355.3888889	126301.2623
	-36.33333333	1320.111111	-448.5	201152.25	-647.3888889	419112.3735
	-33.33333333	1111.111111	-327.5	107256.25	-397.3888889	157917.929
	-38.33333333	1469.444444	-408.5	166872.25	-516.3888889	266657.4846
	-30.33333333	920.1111111	-117.5	13806.25	-149.3888889	22317.04012
	-36.33333333	1320.111111	-319.5	102080.25	66.61111111	4437.040123
	-35.33333333	1248.444444	-76.5	5852.25	-144.3888889	20848.15123
	-27.33333333	747.1111111	-29.5	870.25	12.61111111	159.0401235
	-32.33333333	1045.444444	-49.5	2450.25	-244.3888889	59725.92901
	-24.33333333	592.1111111	149.5	22350.25	278.6111111	77624.15123

	3.666666667	13.44444444	-46.5	2162.25	16.61111111	275.9290123
	13.66666667	186.7777778	-69.5	4830.25	501.6111111	251613.7068
	30.66666667	940.4444444	36.5	1332.25	-10.38888889	107.9290123
	27.66666667	765.4444444	341.5	116622.25	120.6111111	14547.04012
	38.66666667	1495.111111	213.5	45582.25	339.6111111	115335.7068
	40.66666667	1653.777778	363.5	132132.25	349.6111111	122227.929
	41.66666667	1736.111111	350.5	122850.25	281.6111111	79304.8179
	93.66666667	8773.444444	908.5	825372.25	497.6111111	247616.8179
TOTAL		25352		2094944.5		1986130.278

Table 4.5

Descriptives

PatientInc

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	18	46.33	38.617	9.102	27.13	65.54	8	140
2	18	554.50	351.044	82.742	379.93	729.07	84	1463
3	18	1473.39	341.806	80.564	1303.41	1643.36	826	1975
Total	54	691.41	657.911	89.530	511.83	870.98	8	1975

Table 4.6

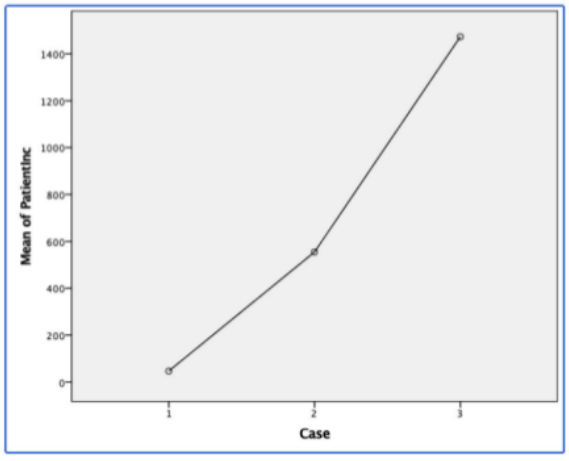


Table 4.7

Test of Homogeneity of Variances

PatientInc

Levene Statistic	df1	df2	Sig.
11.376	2	51	.000

Table 4.8

ANOVA

PatientInc

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18834466.3	2	9417233.13	116.958	.000
Within Groups	4106426.78	51	80518.172		
Total	22940893.0	53			

Table 4.9

Interpretation of the ANOVA table

The test statistic is the F value of 116.958. Using an □=0.05, we have $F_{0.05;2,51}$ between 3.1504 and 3.2317 (tabulated). "Since the test static is much larger than the critical value, we reject the null hypothesis and conclude that there is a (statistically) significant effect on spread of Novel Coronavirus(nCov)".

OBJECTIVE 2 :To determine whether the number of deaths due to COVID-19 in India is due to failure of India's Health Infrastructure compared to developed nations

- ChiSquare Test

Country	Observed Value Patients Under Treatment/ Recovered*	Expected Value for Patients under observation/recovered*	Observed value for Deaths*	Expected value for Deaths*	Total Infected*
United States	1.194361	1.143427331	0.075639	0.1265726691	1.27
Italy	0.184042	0.1926720069	0.029958	0.02132799306	0.214
France	0.082973	0.1242464344	0.055027	0.01375356562	0.138
Spain	0.19493	0.1989743623	0.02607	0.0220256377	0.221
United Kingdom	0.176385	0.1863696516	0.030615	0.02063034843	0.207
Germany	0.161656	0.1521568653	0.007344	0.01684313471	0.169
India	0.051258	0.04775834864	0.001787	0.005286651365	0.053045
Total	2.045605		0.22644		2.272045

Table 4.10

*Values taken per million

$(\chi^2)_{Recovered}=(\chi^2)_{Deaths}= 0.9998883857$

Interpretation of the ChiSquare Value (χ^2)

Calculated ChiSquare Value $\chi^2= 0.9998883857$. "The calculated χ^2 is smaller than the tabulated value($\chi^2_{(0.05,6)} = 12.59$), thus we will accept both the null hypothesis that there is no dependency of death due to COVID-19 upon health infrastructure and India is able to cope up with the situation up till now".

MANAGERIAL IMPLICATIONS

- The introduction of social distancing(6 feet or 1.8 meters) and awareness towards practicing it along with the use of masks to curb the spread.
- The continuous violation of complete lockdown due ignorance of people has risked not only their life but people around them too, thus the public awareness should have been the top priority for administration.
- Complete ban over public gathering and religious functions and educating people about it.
- Facilitating the movement of migrant workers through trains and buses to their native places while following social distancing.
- Arrangement of better quarantine facilities for migrant workers traveling back to their natice places to curb the spread of virus.
- The current situation has emerged as a golden opportunity for the government to invest and improve the basic health infrastructure and turn India into a global pharmaceutical hub by encouraging small and medium pharma companies.

LIMITATIONS AND FUTURE SCOPE OF STUDY

LIMITATIONS

The following limitation of the study are:

- Human error while testing causing false results.
- Faulty or poor quality of testing kits used for testing.
- Factual error in auditing the summary submitted by hospitals of COVID-19 cases as data collected is very large.
- Late reporting or sometimes no reporting about new cases.
- Shortage of human resources for compiling data on a daily basis due to lockdown.

FUTURE SCOPE

Since the data available of COVID-19 cases is limited to the number of confirmed cases and the number of deaths only, there is a lot of scope of further study once a detailed report about COVID-19 cases is available.

Further Study can be based on the following categories, once detailed report is available:

- Analysis on the basis of Age.
- Analysis on the basis of Sex.
- Analysis on the basis completely recovered patients overall
- Analysis of economic loss due to lockdown.

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ANNEXURE 1

$MEAN\ (\bar{x}) = (SUM\ OF\ TOTAL\ INCREASE\ IN\ CASES)/N$

$\bar{x}_1$=834/18=46.33333333

$\bar{x}_2$=9981/18=554.5

$\bar{x}_3$=26521/18=1473.388889

$\bar{\bar{x}}=(\bar{x}_1+\bar{x}_2+\bar{x}_3)/3$

$\bar{\bar{x}}$=691.4074074

0

CALCULATION OF SUM OF SQUARES BETWEEN SAMPLES

Sum Of Squares Between Samples(SSC) = 18834466.26

$Degree\ Of\ Freedom\ (N\ 1) = Number\ Of\ Column - 1$

N_1=3-1=2

$Mean\ Of\ Sum\ Of\ Squares\ Between\ Samples = (Sum\ Of\ Squares\ Between\ Samples)/Degree\ Of\ Freedom\ (N\ 1)$

MSC=18834466.26/2=9417233.13

CALCULATION OF SUM OF SQUARES WITHIN THE SAMPLES(SSE)

Sum Of Squares Within The Samples(SSE)=4106426.778

$Degree\ Of\ Freedom\ (N\ 2) = (Number\ of\ Row * Numberof\ Column) - Number\ Of\ Column$

N2= 54-3=51

$Mean\ Of\ Sum\ Of\ Squares\ within\ the\ Samples = (Sum\ Of\ Squares\ within\ the\ Samples)/Degree\ Of\ Freedom\ (N\ 2)$

MSE=4106426.778/51=80518.17211

$F = M\ SC/MSE$

F=9417233.13/80518.17211=116.9578603

ANNEXURE 2

- EXPECTED VALUES FOR RECOVERED PATIENTS/UNDER TREATMENT PATIENT

  E1=(1.27*2.045605)/2.272045=1.143427331

  E2=(0.214*2.045605)/2.272045=0.1926720069

  E3=(0.138*2.045605)/2.272045=0.1242464344

  E4=(0.221*2.045605)/2.272045=0.1989743623

  E5=(0.207*2.045605)/2.272045=0.1863696516

  E6=(0.169*2.045605)/2.272045=0.1521568653

  E7=(0.053045*2.045605)/2.272045=0.04775834864

- EXPECTED VALUES FOR DEATHS

  E1=(1.27*0.22644)/2.272045=0.1265726691

  E2=(0.214*0.22644)/2.272045=0.02132799306

  E3=(0.138*0.22644)/2.272045=0.01375356562

  E4=(0.221*0.22644)/2.272045=0.0220256377

  E5=(0.207*0.22644)/2.272045=0.02063034843

  E6=(0.169*0.22644)/2.272045=0.01684313471

  E7=(0.053045*0.22644)/2.272045=0.005286651365

Spread of Novel Coronavirus(nCov) & Deaths due to COVID-19 :

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