ANALYTICAL OBSERVATION ON IMPACT OF PANDEMIC VIRUS

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Vivekananda Journal of Research
October, 2021, Vol. 10, Special Issue, Pg No.26-34
ISSN 2319-8702(Print)
ISSN 2456-7574(Online)
Peer Reviewed Refereed Journal
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http://www.vips.edu/vjr.php

Abstract

No one would have ever encountered or witnessed the sufferings and pain on human society as compared to an ongoing pandemic. The situation has not only taken many lives, but also changed the behavioral, societal, and economical aspects of life. The structural complexes and impact require deep understand to perform behavioral analysis and remove any societal negative impacts. The uniqueness of impact can be derived based on multiple scientific parameters, which make it more difficult due to geographical, environmental, societal, or economic differentiations. The identification necessitates in depth survey and experts in multiple fields having deep understanding and knowledge. Therefore, it has become important to use the newer technologies like machine learning to provide scientific recognition and evidence to recognize; and act on various aspects. This paper is just an initial step of the larger study, to correlate the data, get an insight focus on various models and potential method to identify pandemic impact using machine learning models. Data on certain key countries was analysed using simple tools to be fed further into model to correlate with other features of study including social, economic and behavior impact.

Keywords: *Pandemic, Corona Virus, Machine Learning, Models, Social impact*

1. INTRODUCTION

It was December 2019 when first case was officially reported at Wuhan, China; from then onward within 6 months it spreads across Globe. The name Corona viruse was given due to the crown-like spikes it builds on the surface. The virus develops positive-sense RNA viruses which are further divided into four groups i.e. alpha, beta, gamma, and delta coronaviruses.

After an initial spread at Wuhan, besides multiple measures across Globe the virus reaches to every part of Globe. All countries irrespective of its density, the volume, the resources, the medial infrastructure got impacted. From various countries across Globe, random countries were selected based on:

- Population
- Population density
- The medical resources
- The known economical situations
- Geographical spread
- Location and
- Area of the country

By including these random countries, the paper tries to identify the impact of deadly virus. Basis this, observations have been made to find the

- Death versus the active cases
- Tests conducted versus the active cases
- Tests conducted for 1M of population
- No. of patient recovered versus the tests conducted per million of population

The paper is divided into multiple sections with each finding separately. The data is from the start of pandemic to the September'21. The data relies on various websites depicting officially released data by various counties. This should give us the sufficient view and information required for the subsequent research.

Basis this finding an exploratory research would be conducted to develop machine learning models to find the correlation among social, behavioral, economical, and other aspects of life impacted by pandemic. It is anticipated that using technology and models' corrective actions can be taken for similar ongoing and future scenarios.

2. METHOLOGY

Instigations have been carried out by performing exploratory research from various available resources based on Government released data onto various platform.

Below were the countries selected without any specific preferences. The countries were selected based on authors prior understanding about geographical spread, population density, media analysis and known economical states. If required, additional country information will be taken to analyse any abnormalities or research.

Country	Total cases	Total Death	Total recovered	Total tests	Tests/ 1M pop	Population
Afghanistan	1,55,380	7,220	1,25,636	7,64,673	19,103	4,00,29,966
Algeria	2,04,046	5,831	1,39,806	2,30,861	5,148	4,48,46,762
Australia	1,17,826	1,379	89,905	3,89,58,695	15,05,807	2,58,72,308
Brazil	2,14,99,074	5,98,871	2,04,88,785	6,37,76,166	2,97,377	21,44,62,541
China	96,310	4,636	90,836	16,00,00,000	1,11,163	1,43,93,23,776
Ethiopia	3,50,204	5,811	3,18,007	35,12,959	29,635	11,85,40,430
Fiji	51,328	647	47,291	4,18,029	4,62,101	9,04,627
France	70,33,755	1,16,923	68,09,681	14,32,34,831	21,88,277	6,54,55,540
India	3,38,71,881	4,49,568	3,31,75,656	57,68,03,867	4,12,862	1,39,70,87,126
Japan	17,06,675	17,789	16,71,725	2,51,20,205	1,99,385	12,59,88,246
Kenya	2,50,380	5,150	2,43,064	25,81,391	46,714	5,52,59,708
New Zealand	4,450	27	4,073	34,89,770	6,97,661	50,02,100
Nigeria	2,06,561	2,731	1,94,475	30,90,114	14,538	21,25,57,039
Pakistan	12,53,868	27,986	11,81,054	1,96,85,529	86,995	22,62,84,627
Russia	76,62,560	2,12,625	67,78,900	19,45,00,000	13,32,070	14,60,13,340
S. Korea	3,23,379	2,536	2,87,040	1,47,80,951	2,87,988	5,13,24,800
Singapore	1,09,804	130	86,211	2,00,13,983	33,87,441	59,08,289
Taiwan	16,267	844	15,271	64,72,449	2,71,142	2,38,71,105
UAE	7,37,229	2,107	7,30,309	8,58,10,321	85,46,155	1,00,40,810
UK	79,67,985	1,37,152	64,91,069	30,83,76,986	45,12,706	6,83,35,277
USA	4,47,81,200	7,24,728	3,42,82,121	65,06,89,273	19,51,398	33,34,47,797

Table 1: Coronavirus data of various countries

3. OBSERVATIONS:

Analytical methods were deployed to gain an insight from the data to articulate the scenarios and observations. The data could be further used in correlation with various parameters to build machine learning models which can potentially resolve pandemic impact.

3.1. Number of deaths versus number of active cases

With the data, the observations were made on the number of deaths in comparison to the observed cases.

Country	% Total cases versus deaths
Singapore	0.001
UAE	0.003
New Zealand	0.006
S. Korea	0.008
Japan	0.010
Australia	0.012
Fiji	0.013
Nigeria	0.013
India	0.013
USA	0.016
Ethiopia	0.017
France	0.017
UK	0.017
Kenya	0.021
Pakistan	0.022
Russia	0.028
Brazil	0.028
Algeria	0.029
Afghanistan	0.046
China	0.048
Taiwan	0.052

Table 2: Percentage of total cases versus deaths

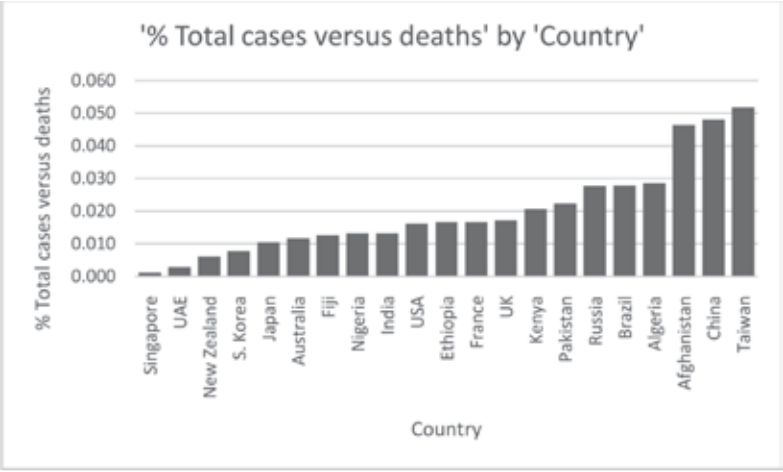


Figure 1: Countries with % of cases versus deaths

Outcome:

- Smaller and progressive countries like Singapore and UAE were able to control the number of deaths versus the number of active cases. This could be because of better health infrastructure
- Taiwan being a comparatively smaller country observes highest number of deaths %, the specific geographical location, health infrastructure and others can be explored
- Besides world's second largest population, India was able to control the number of deaths
- Under-developed countries observed more deaths

3.2. Number of tests conducted versus the active cases

Analysis was performed to understand the number of tests conducted versus the active cases found in the country.

Country	% of tests conducted versus active cases
Algeria	0.011
Brazil	0.030
Afghanistan	0.049
Fiji	0.081
Ethiopia	0.100
Kenya	0.103
USA	0.145
Japan	0.147
Nigeria	0.150
Pakistan	0.157
India	0.170
France	0.204
Russia	0.254
UK	0.387
S. Korea	0.457
UAE	1.164
Singapore	1.823
Australia	3.306
Taiwan	3.979
New Zealand	7.842
China	16.613

Table 3: Percentage of tests conducted versus active cases

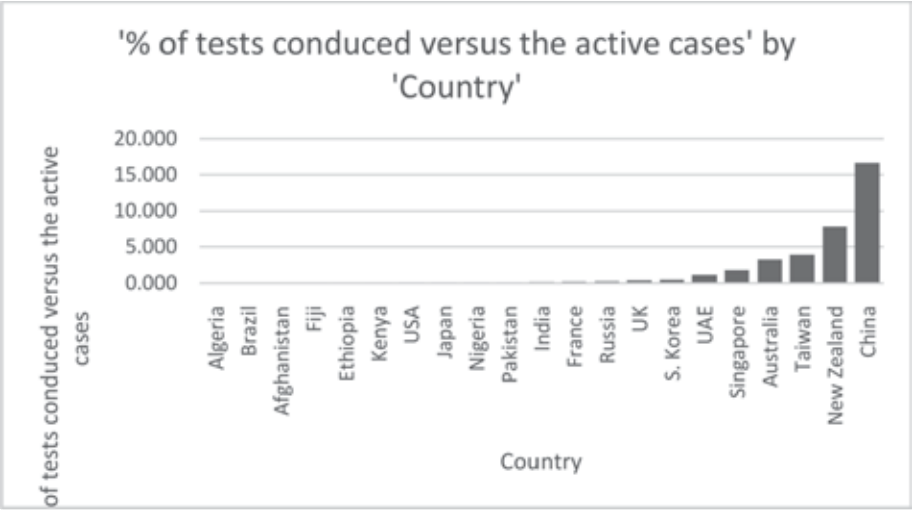


Figure 2: Chart defining Percentage of tests conducted versus active cases

Outcome:

- It was observed that most of the underdeveloped countries had not conducted enough tests.
- Most of the developed countries have performed testing for the active cases
- Smaller counties were able to perform more tests as compared to geographically large countries

3.3. Number of tests conduct for 1Million of population

The testes were performed to understand the correlation between the tests conducts versus the 1 Million population of the country.

Country	Tests/ 1M population
Algeria	5,148
Nigeria	14,538
Afghanistan	19,103
Ethiopia	29,635
Kenya	46,714
Pakistan	86,995
China	1,11,163
Japan	1,99,385
Taiwan	2,71,142
S. Korea	2,87,988
Brazil	2,97,377
India	4,12,862
Fiji	4,62,101
New Zealand	6,97,661
Russia	13,32,070
Australia	15,05,807
USA	19,51,398
France	21,88,277
Singapore	33,87,441

UK	45,12,706
UAE	85,46,155

Table 4: Number of tests conducted per 1 Million population

Outcome:

- Outcome clearly defined that developed countries have performed much more tests for their population as compared to the underdeveloped or developing country.
- It was also observed that besides having resources countries like Japan and China were not able to do enough tests

3.4. Number of patient recovered versus the tests conducted / Million population

Correlation between number of patient recovered versus tests conducted for the 1M population was performed.

Country	% patient recovered versus the Tests / 1M Population
New Zealand	0.006
Singapore	0.025
Taiwan	0.056
Australia	0.060
UAE	0.085
Fiji	0.102
China	0.817
S. Korea	0.997
UK	1.438
France	3.112
Russia	5.089
Kenya	5.203
Afghanistan	6.577
Japan	8.384
Ethiopia	10.731
Nigeria	13.377
Pakistan	13.576
USA	17.568
Algeria	27.157
Brazil	68.898
India	80.355

Table 5: % of patient recovered as compared to tests conducted

Outcome:

- Large countries without preforming tests were witnessing the death the most.
- Countries performing more test and better facilities were able to control much better way

- With more testes countries like Singapore and Taiwan were able to retain casualties

4. KEYFINDINGS AND RESULTS

The correlation helped us scientifically correlate and identify some obvious and non-obvious patterns. The evidences will help us to further validate and perform segregation of countries into various groups. Grouping can further be required to get deep insights using mathematical models. Some of the observations from above analysis are as below:

- All countries irrespective of geography, size, economic status had suffered due to pandemic
- Underdeveloped countries, due to an obvious reason were not able to perform enough testing and hence impacted a lot
- It is possible to retain causality besides large populations
- There is a definite linkage of geographical location which makes virus more deadly
- With more testing, countries with less population and areas were able to retain casualties like Taiwan, Singapore and New Zealand

5. CONCLUSION

The pandemic has impacted each and every corner of the Globe, none of the country and society were able to restrain form its very effect. It is impossible to calculate, predict and analyse, the mortality and societal impact of the same. The consequences include economic recession, psychological imbalance, societal disturbance and governance crises.

The pandemic has led to a loss of human life worldwide, unprecedented challenge to public health, food systems and trust among each other.

Study reveals obvious and non-obvious astounding findings like:

- Geographical location might have linkages with environment and its spread like in Taiwan
- Besides all resources and health infrastructure, it requires a governance model to handle such crisis like Japan
- Population density may not have direct correlation with causality like India
- Pro-active monitoring could save the casualty

We need to craft measure, guidelines and equipped ourselves all time to confront similar situation in future. The observations enable us to leverage technologies like machine learning to build models for correlation with other parameter to avoid repeat of its impact.

6. FUTURE SCOPE OF WORK

The paper is an initial step and has led way to the multiple studies. The future scope will include:

- -Building machine learning models to replicate performance of a selected country. During an initial finding it is observed that it is important to replicate Taiwan model at smaller, similar geographical locations may be a state of an India.

- Identify the societal parameters including behavioural, psychological, emotional and economical.
- Those parameters can further corelate with our studies to find logic to avoid any such things in future.

ACKNOWLEDGEMENT

The authors also thankful to all the journals mentioned in the references, multiple anonymous journals referred during course of study and experts for the support and encouragement.

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