

COVID-19 Pandemic in the SAARC Countries including China: A Cross-Country Analysis from Geographical Perspectives

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Introduction

Mankind has observed various pandemics throughout the human history where some of these were more disastrous than the others to the humans. Once again we are observing a very strange time fighting with an invisible enemy; the novel COVID-19 coronavirus. Coronavirus has family of coronaviruses because corona means crown and so this refers to the way that the virus looks under the microscope, like there's a crown on the top of the virus. Some of them, four or five different kinds, can cause common diseases among humans, everything from the common cold to mild or moderate respiratory (nose, throat, lung) illnesses. Other coronaviruses can cause more serious diseases, including Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). Most of the time coronaviruses affect animals, and sometimes, on rare occasions, we see coronaviruses jump from animal species into the human population. The 2019 novel coronavirus is getting a lot of attention now because it is a new kind of coronavirus we haven't seen among humans before. The virus that causes COVID-19 is similar to the one that caused the 2003 SARS outbreak: both are types of coronaviruses. Much is still unknown, but COVID-19 seems to spread faster than the 2003 SARS and also any less severe illness. The coronavirus has completely changed our way of life, shut down entire countries and shuttered business across the globe. On March 11, Tedros Adhanom Ghebreyesus, director-general of the World Health Organization, announced the outbreak of the disease, dubbed COVID-19, would be declared a pandemic.

The virus appears to have originated in Wuhan, a Chinese city about 650 miles south of Beijing that has a population more than 11 million. Although health officials are still tracing the exact source of this new coronavirus, early hypotheses thought it may be linked to a seafood market in Wuhan, China. According to a government report, a 55 year old from Hubei province could have been the first person to have contracted the viral infection on November 17 last year and cases rapidly spread at home and abroad before Chinese health officials could identify the deadly virus since then (Economic Times, 13 March 2020). According to the World Health Organisation, the first confirmed COVID-19 case was on

December 8. Whereas a prestigious medical journal The Lancet published an extensive summary of the clinical features of some of the first patients infected with the disease stretching back to Dec. 1, 2019.

The COVID-19 virus affects different people in different ways. Symptoms of COVID-19 could appear as soon as two days after exposure or as long as 14 days later, according to the Centers for Disease Control and Prevention (CDCP). Common symptoms include fever, tiredness, and dry cough, whereas other symptoms include shortness of breath, sore throat, aches and pains, and a very few people will report diarrhea, nausea or a runny nose (www.who.int).

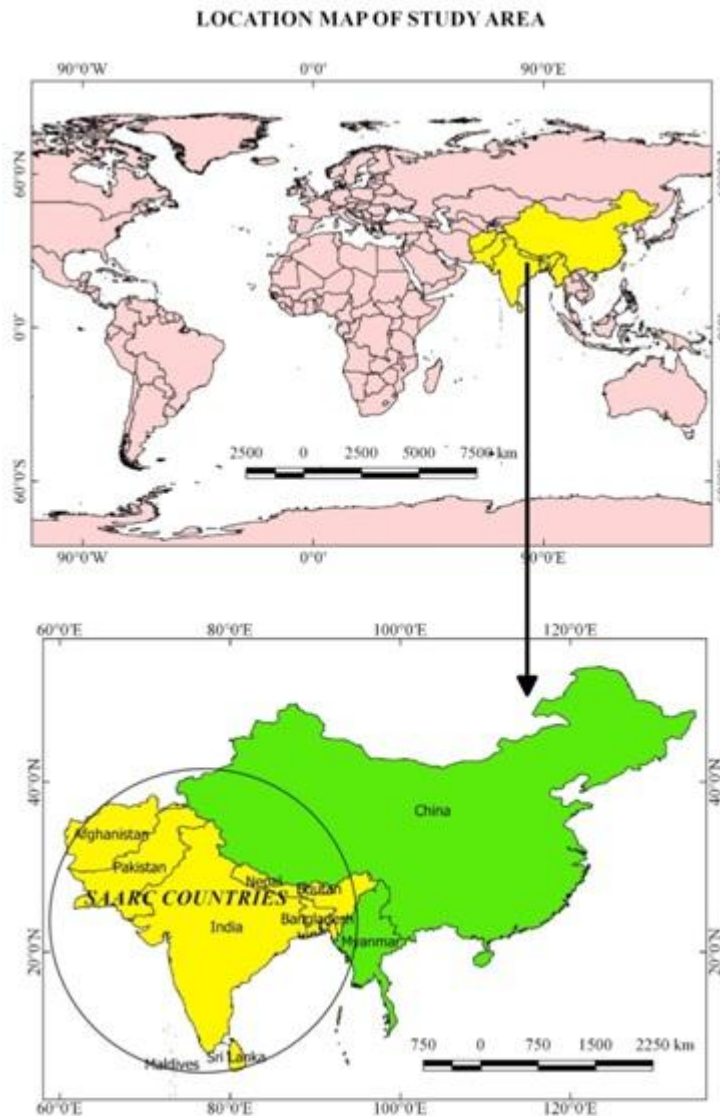
The COVID-19 virus spreads, as identified by the ICMR and WHO advisories, primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. On 30th January, India reported its first case of COVID-19 in Kerala, which rose to three cases by 3rd February; all the infected individuals were students who had returned from Wuhan, China. No significant rise in cases was seen in the rest of February. On the 4th March 2020, about 22 new cases came into light, including those of an Italian tourist group with 14 infected members. Confirmed cases crossed 100th mark on 14th March, 1000 on 28th March, 5000 on 7th April and 10000 on 13th April. As on 14th April total confirmed cases in India was 11487, on the other hand 1359 are cured/discharged, with 393 deaths had been reported in the Govt of India dedicated website for the purpose i.e. covid19india.org. At the state level Maharashtra is followed by Delhi and Tamilnadu with a maximum number of cases of coronavirus reported as on 14th April.

The first case outside of China was reported in Thailand on 13th January, 2020. Since then, this ongoing outbreak has now spread to more than 200 other countries (Hamzah.et.al, 19 March 2020). Globally confirmed cases crossed 500 on 23 January, 1000 on 25 January, 20000 on 4th February, 50000 on 15th February, 1 million on 7th March and more 1.5 million on 15th March. As of 14th April worldwide total confirmed cases 1993822, of which 465967 are cured/ discharged, with 126203 deaths had been reported (www.worldometers.com). Thus the growth of COVID-19 was essentially exponential causing alarming situation throughout the globe. The United States has more than 4 times confirmed cases compared to the country

recording the second highest Corona cases and also has the world's highest death toll followed by Spain, Italy, France, UK and Germany.

The Study area

For the present paper, the SAARC (South Asian Association for Regional Cooperation) countries along with China have been selected as the study (Fig. 1). SAARC was established with the signing of the SAARC Charter in Dhaka on 8th December 1985. With the Secretariat of the Association was set up in Kathmandu SA
Figure 1: Study Area Map
States: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka on 17 January 1987.



Literature Review

The problem under study being a current one and came to exist for only a few months, the number of literatures available on this issue is highly limited. However, a very few similar literatures are available as of today. A short review of the available literature presented below to help understanding the nature of problem as well as studies already conducted and thereby helping to find research gap. Jullen and Christian (2020) discussed the pattern of early human to human transmission of Wuhan 2019-nCoV, December 2019 to January 2020 as a case study. The study concluded that early pattern of human to human transmission of 2019-nCoV is reminiscent of SARS-CoV emergence in 2002. Morteza and Fakher (2020) discussed the cross-country comparison of case fatality rates of COVID-19/SARS-COV-2 as a case study. The study depicted efforts of the authors to observe the CFR of different countries during an ongoing COVID-19 pandemic using recent country level data. The data from this study supports the fact that case fatality rate (CFR) of COVID-19 pandemic seems to be less than Bird flu, Ebola, SARS, and MERS but public health concerns remain highly infectious in nature.

Objectives

The present study is aimed at achieving the following objectives:

- To find out the nature spread of COVID-19 pandemic in the region and its spatial pattern form geographical perspectives.
- To trace the temporal trend of COVID -19 cases in the region.
- To examine the relationship of between Life Expectancy at Birth and Death Ratio.
- To examine the relationship of between Human Development Index (HDI) and Recovery Ratio.

Database

The paper has been mostly prepared with the help of secondary data. As such COVID-19 being highly contagious and prevailing lockdown condition left no option open for filed survey or collection of primary data. The data were retrieved from accurate databases

including Worldometer (www.worldometers.com), World Health Organisation (www.who.int), United Nations Development Programme (www.undp.org) and Covid19india.org. Due to the rapid increase in data, the analysis in this study was performed from origin date to 14th April 2020. Fourteenth April being the end of first phase of lockdown in India hence the date has been chosen for the study.

Methodology

Research methodology involved in this paper is primarily based on survey and analysis of secondary sources of information and data. The study begins with survey of literature to form certain basic idea of the problem and framing a research gap. Survey of existing literature has helped to understand the problem as well as the trends and patterns thereby. The data collected from the different sources have been analysed using suitable software and the results have been presented using suitable cartographic techniques. Quantitative techniques have been applied to assess the relationship between the variable such as Death Rate with LE and Recovery Rate with HDI.

Tools and Techniques

QGIS (2.14.22) software has been used for preparing the study area maps. MS Excel (2007) is used for analysing the data and also for graphical representation of result. Different quantitative techniques such as correlation coefficient used to analyse data to fulfil the objectives. Regression analysis also has been done to ascertain impact of one variable (independent variable) on other (dependent variable).

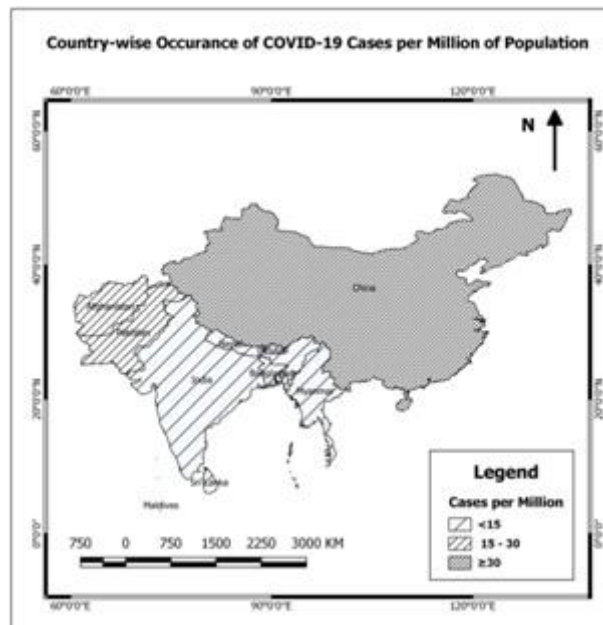
Result and Discussion

On 31 December 2019, the World Health organization (WHO) was alerted about a cluster of pneumonia of unknown aetiology in the city of Wuhan, China. Only few days later, Chinese authorities identified and characterised a novel coronavirus (2019-n CoV) as the causative agent of the outbreak (Jullien and Christian, 2020). WHO declares COVID-19 outbreak as a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 (Hamzah.et.al, 19 March 2020). The 2019 novel coronavirus is getting a lot of attention now because it is a new kind of coronavirus we haven't seen among humans before. The first positive case was reported on 17 November in last year in China (Economic Times, 13 March 2020). For about one month after that date there were one to five new cases reported each day,

the Chinese government report said, and by 20 December there were 60 confirmed cases. Now almost more than 81000 of the cases occurred in China, mostly in the province of Hubei. The coronavirus pandemic, which originated in China, has been making its way into many countries including those in South Asia. While India has seen at least 11487 cases of coronavirus so far till 14th April, 2020, here is how its neighbouring nations are faring (The News Mint, 17 March 2020). Pakistan has the most number of coronavirus cases among India's neighbours after china, followed by Bangladesh, Afghanistan, Sri Lanka and Myanmar. The island nation, Maldives, has only 20 cases of coronavirus. Both Nepal and Bhutan has also a few cases of COVID-19 (www.worldometers.com).

Beside this as per a report by Economic Times (Mar 21, 2020) India has emerged as the first responder to the needs of its neighbours in the wake of the COVID-19 crisis, deploying quick response medical supplies, even as China has yet to dispatch any assistance to the countries in the region. Under the fast changing pandemic situation the Maldives, Sri Lanka, Afghanistan, Nepal and Bangladesh have sought support under the SAARC emergency fund for containing COVID-19 and its impact (Dipanjan, 21st Mar, 2020).

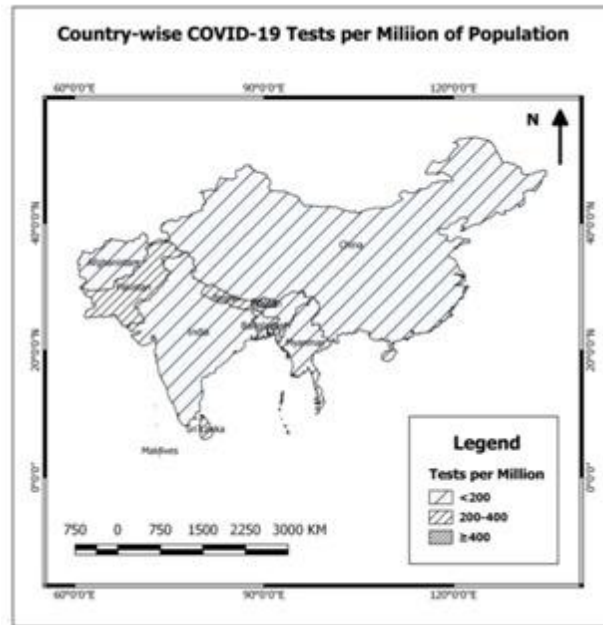
Reported Cases per Million Persons



Novel coronavirus or COVID-19 cases in SAARC countries along with China are well over 101636 as of 14th April, 2020 (Table 1). The number of reported cases in the world kept on increasing during March, mostly due to people with travel records to the affected locations. Figure 1 related to total coronavirus cases/ million of population, depicts that among these countries China holds up the first place with more than 50 COVID positive cases per million populations. The largest as well as densely populated country of the world and being a source region of COVID-19 can be blamed for this contamination worldwide. Next in the list is Maldives where around 37 people per million is found to be positive. Maldives is an island nation in South Asia and also known for natural beauty endowed tourist destination. By tourism ministry of Maldives the first positive cases have caught the disease from an Italian tourist who had returned to Italy and tested positive there. Pakistan has also reported around 26 people tested positive per million of population. The highest number of affected people is in Sindh province of that country. Afghanistan and Sri Lanka also reported 18 and 11 positive cases per million of population for Covid-19 cases. India being the densely populated country, number of total cases per million of population is 8 as per the date till 14th April, 2020, which is quite impressive. Bangladesh and Bhutan reported only 6 per million of population where as both Nepal and Myanmar reported one person per million of population (Fig. 2). The high rate of infection is attributed to apparently high international contact-interaction and low level of peoples' awareness as found by public health experts.

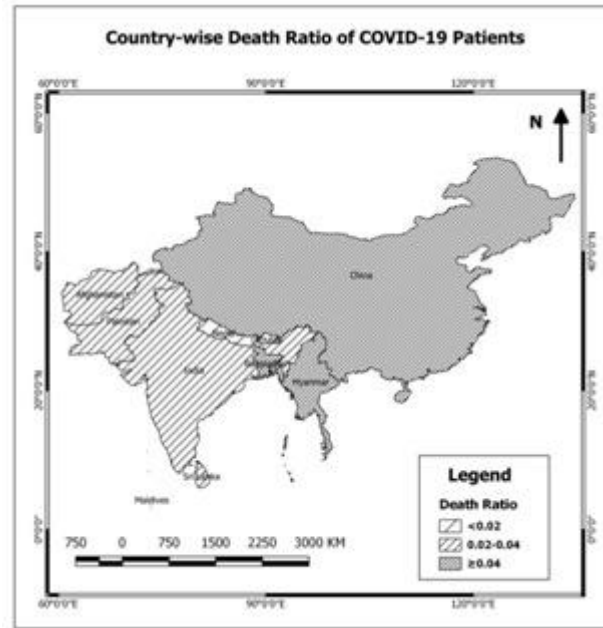
Tests per Million Persons

In response to eradicate growth of COVID-19 pandemic cases, there is need to use of proper testing method to detect. WHO prescribes 'identify, isolate, test and treat' to combat COVID-19 along with complete lockdown to stop spread of infection. An antibody test shows how many people have the disease, including those whose symptoms were minor or who were asymptomatic. According to World Health Organisation, there are no specific vaccines or antidote of COVID-19, but still some people recovered with only maintaining proper isolation and by some supporting treatment



Due to limited testing, as of March 2020 no countries have reliable data on the prevalence of the virus in their population. As on 14th April 2020, the countries that published their testing data have on an average performed a number of tests equal to only 0.4 per cent of their population and no country has tested samples equal to more than 10 per cent of its population. There is variation in how much testing have been done across the countries. This variability is also likely to be affected the fatality rates. Figure 3 depicts that Maldives is at the first place with more than 5000 tests per million of population. Next is Bhutan with more than 1500 tests per million of population. Pakistan, Sri Lanka, Nepal and India are in the next positions where number of tests per million of population is more than 150. The lowest number of sample test observed in Bangladesh and Myanmar. So far, China has not released any information related to sample test of COVID-19 (Fig. 3) till date.

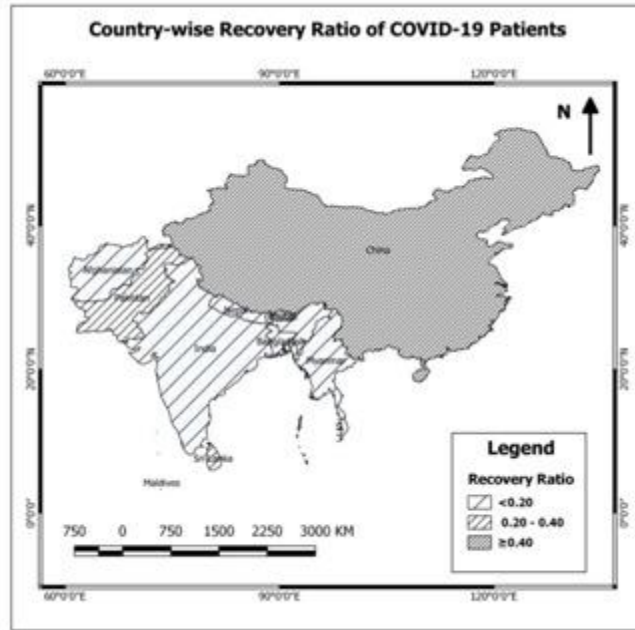
Death Ratio



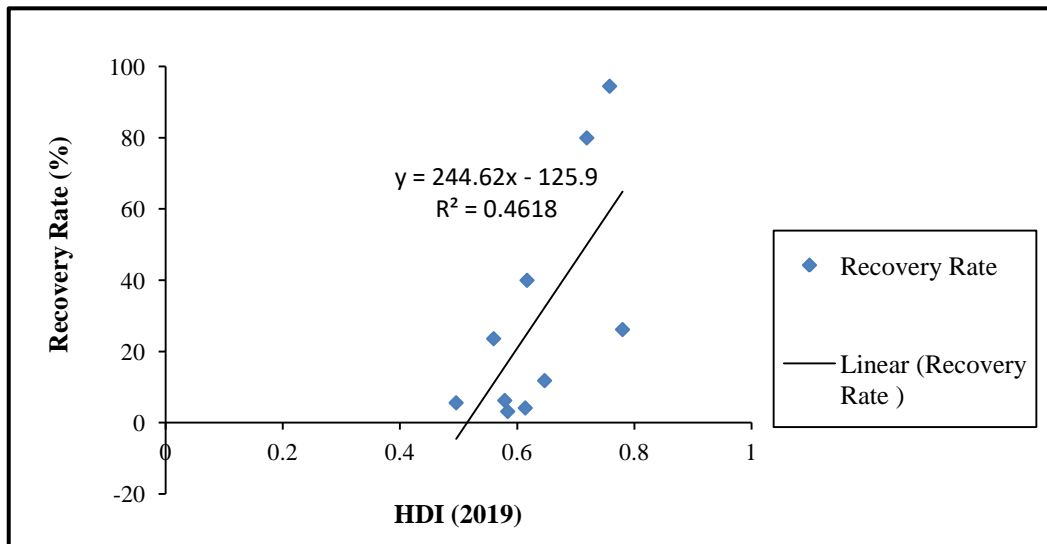
An outbreak of novel COVID-19 pandemic from Wuhan, China has spread quickly in different countries in the region. The number of infected people as well as fatality rate increases as days goes on. With consider the death ratio, Myanmar, Bangladesh and China registered the highest number of deaths, where minimum death ratio is 0.04. Other countries like Afghanistan, India, Sri Lanka and Pakistan registered lesser number of deaths, where minimum death ratio is 0.02. As of 14th April 2020, no people died among the rest of the countries like Bhutan, Maldives and Nepal (Fig. 4).

Recovery Ratio

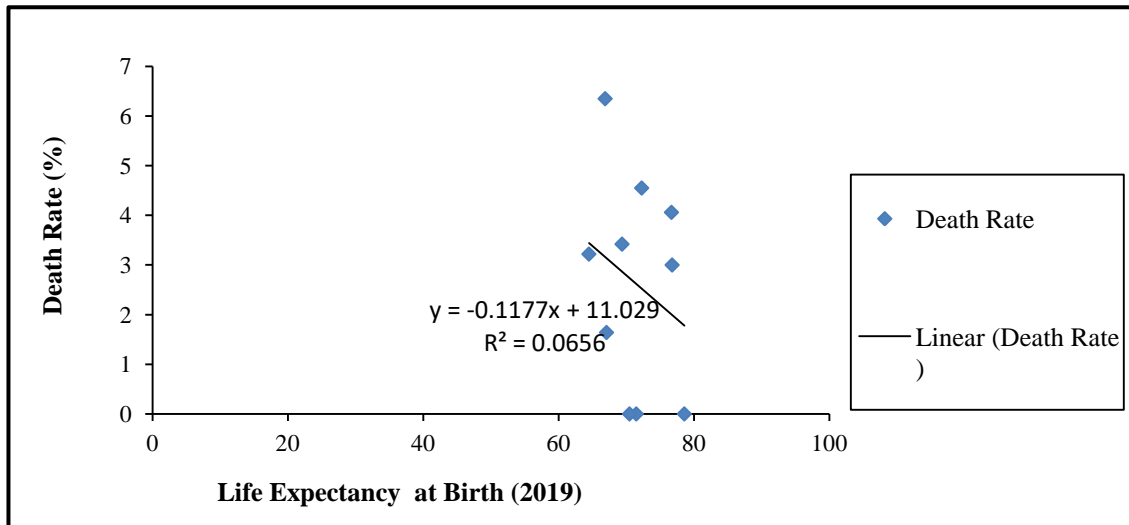
Global clinical experience of dealing coronavirus pandemic shows that a person may recover from COVID-19 in between two to eight weeks provided the person is having good immunity power and medical support is provided timely and adequately. World Health Organisation says that there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments. China and Maldives have registered recovery ratio above 0.8, which means two third of the total COVID-19 positive people recovered. Bhutan, Sri Lanka and Pakistan fall under the recovery ratio of 0.2 to 0.4. Recovery ratio in India is very low at the tune of 0.1, which is quite disappointed being one of the worst. Rest of the countries have reported recovery ratio even below 0.1 (Fig. 5).



Relating Recovery Rate with Human Development Index (HDI)



Relating Death Rate with Life Expectancy at Birth (LE)



If correlation between Life Expectancy at birth and death rate is taken into consideration, the relation becomes negative (Table 6). Life Expectancy means the average period that a person may expect to live. Being a high life expectancy value, the death rate of a country becomes low but in this case the result came reverse. The most likely reason behind this the COVID-19 infection and fatality is due to high risk for elderly people. As a result maximum elderly people are died due to COVID-19 because immunity power of elderly people is very less. This gave rise to a pattern that a country having high life expectancy is experiencing higher death rate the proportion of elderly people to the total population of the country is high.

Conclusion

The present study adequately throws light in the spatio-temporal trend of spread of COVID-19 infections in the SAARC countries including China. The varying pace of spread is noticed in the countries. The countries having weak international interaction have late arrival and hence spread is also comparatively low. Semi-seclusion of the society has protected from infection to a great extent. The rate of te

Figure 7: Relation between LE and Death Rate

also

death rate have recorded large variation in the countries. India has recorded one of the lowest testing rate as well as recovery rate. However, natural immunity, early countrywide lockdown have effectively checked spread of COVID-19 in India. Finally the effort of finding correlates of recovery rate and death rate being HDI and Life Expectancy at Birth have been done successfully.

General Abbreviations

SAARC: South Asian Association for Regional Cooperation; **2019 n-CoV:** Novel Coronavirus-2019; **COVID-19:** Coronavirus Disease-2019; **SARS-CoV-2:** Severe Acute Respiratory Syndrome Coronavirus-2; **SARS:** Severe Acute Respiratory Syndrome; **MERS:** Middle East Respiratory Syndrome; **HDI:** Human Development Index; **LE:** Life Expectancy at birth; **WHO:** World Health Organization; **MS Excel:** Microsoft Excel; **QGIS:** Quantum GIS; **CFR:** Case Fatality Rate.

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Appendix

Table 1: Distribution of Cases per 1 Million of People

Country	Total Cases	Cases per million
China	82249	57
Maldives	20	37
Pakistan	5837	26
Afghanistan	714	18
Sri Lanka	233	11
India	11487	8
Bangladesh	1012	6
Bhutan	5	6
Myanmar	63	1
Nepal	16	1

Source: Calculated by the authors based on data from www.worldometer.com, retrieved on 15th April 2020

Table 2: Distribution of Tests per 1 Million People

Country	Tests/1M Population
Maldives	5363
Bhutan	1511
Pakistan	316
Sri Lanka	222
Nepal	216
India	177
Bangladesh	90
Myanmar	44
Afghanistan	0
China	0

Source: Calculated by the authors based on data from www.worldometer.com, retrieved on 15th April 2020

Table 3: Proportion of Deaths to Total Cases

Country	Death Ratio (No. of deaths/total cases)
Myanmar	0.06
Bangladesh	0.05
China	0.04
Afghanistan	0.03
India	0.03
Sri Lanka	0.03
Pakistan	0.02
Bhutan	0
Maldives	0
Nepal	0

Source: Calculated by the authors based on data from www.worldometer.com, retrieved on 15th April 2020

Table 4: Proportion of Recovered to Total Cases

Country	Recovery Ratio (No. of recovered/total cases)
China	0.9
Maldives	0.8
Bhutan	0.4
Sri Lanka	0.26
Pakistan	0.24
India	0.12
Afghanistan	0.06
Nepal	0.06
Bangladesh	0.04
Myanmar	0.03

Source: Calculated by the authors based on data from www.worldometer.com, retrieved on 15th April 2020

Table 5: Relation between Recovery Rate and HDI

Name of Countries	HDI (2019)	Recovery Rate (No. of recovered/total cases)*100	Correlation Value (r)
China	0.758	94.52	0.68
Maldives	0.719	80	
Bhutan	0.617	40	
Sri Lanka	0.78	26.18	
Pakistan	0.56	23.61	
India	0.647	11.83	
Nepal	0.579	6.25	
Afghanistan	0.496	5.6	
Bangladesh	0.614	4.15	
Myanmar	0.584	3.17	

Source: Calculated by the authors based on data from www.worldometer.com, retrieved on 15th April 2020

Table 6: Relation between Death Rate and Life Expectancy (LE)

Name of Countries	LE (2019)	Death Rate (No. of death/total cases)*100	Correlation Value (r)
Maldives	78.6	0	-0.26
Sri Lanka	76.8	3	
China	76.7	4.06	
Bangladesh	72.3	4.55	
Bhutan	71.5	0	
Nepal	70.5	0	
India	69.4	3.42	
Pakistan	67.1	1.64	
Myanmar	66.9	6.35	
Afghanistan	64.5	3.22	

Source: Calculated by the authors based on data from www.worldometer.com, retrieved on 15th April 2020

Table 7: Categorisation of Countries on the basis of Death and Recovery Ratio

Death Ratio (No. of deaths/total cases)	Name of Countries	Recovery Ratio (No. of recovered/total cases)	Name of Countries
Less than 0.02	Bhutan, Nepal, Maldives	Less than 0.2	Bangladesh, Myanmar, Nepal, Afghanistan, India
0.02-0.04	Pakistan, Sri Lanka, Afghanistan, India, China	0.2-0.4	Pakistan, Sri Lanka
More than 0.04	Bangladesh, Myanmar	0.4-0.6	Bhutan
-	-	More than 0.6	China, Maldives

Source: Calculated by the authors based on data from www.worldometer.com, retrieved on 15th April 2020