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COVID 19 fatalities burden in Asian countries: An analysis of pattern and determinants

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ARTICLE INFO

Keywords:
COVID 19 death burden
Socio economic determinants
Social capital
Social distancing stringent measures
Voters’ turnout ratio
Per capita GNI
Poverty
Co-morbidity
Ageing

ABSTRACT

Covid 19 pandemic has severe implications on health and life of people. Asia being the most populous region has higher fatalities burden. Health infrastructure, stringent preventive measures by the government and public participation through adhering to social distancing have influence to check on fatalities’ burden. The level of Social capital as well as voters’ participation in a particular country can have influence on containment of COVID cases and fatalities. In this context, the main objectives of this study are to analyse pattern and trend of death burden. However, for regression analysis only 32 countries are taken into account considering the availability of data for all variables. Multiple linear regression analysis is employed in a cross-sectional framework and Ordinary least square estimation technique with heteroscedastic adjusted standard errors have been used for estimation of coefficients. The results show that southern Asia contributes the highest share of fatality cases in total fatality cases of Asia with 71.43% share. It also has the highest share of confirmed cases in total confirmed cases of Asia with 71.72%. However, when we take the population into account, Western Asia leads in the share of confirmed COVID-19 cases and its associated fatality cases per million populations in Asia as compared to other Asian regions.

The factors like health infrastructure and voters’ turnover ratio are found to be significant and potential in reducing the new deaths per million populations. Though the coefficient of Stringency index has been negative and it did not emerge to be significant in Asian countries. The COVID related fatalities in Asian region are urban centric and urbanization proxy is found to be positive and significant. Diabetes prevalence rate has some heterogeneous result and in the present study its coefficient is not in the hypothesized direction. .

The Countries should ramp up health infrastructure and necessary preparedness to deal with the subsequent waves and COVID related fatalities. Importance need to be given people’s participation and their shared responsibilities in dealing with COVID cases and checking on fatalities. The realisation of social responsibility among the masses can lead to community participation and adhering to the protocols imposed by the government and helps in checking on spread of virus and associated death.

1. Introduction

The outbreak of SARS coronavirus-2 (SARS-CoV-2), popularly known as Corona Virus Disease 2019 (COVID-19) has caused a severe health crisis in the World. As on November 1, 2020, 218 countries and territories have been affected by the novel corona virus with more than 40.68 million cases causing death of more than 1.2 million deaths globally Worldmeter (2020). According WHO, the total number of corona virus cases in Asian countries is more than 10.37 million with around 2.45 lakhs deaths as on November 1, 2020 and the number is

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https://doi.org/10.1016/j.ssaho.2022.100378
Received 18 September 2021; Received in revised form 18 October 2022; Accepted 18 November 2022
Available online 30 November 2022
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As most of the countries were not prepared to face such a health emergency, the pandemic escalated the mortality rate due to lack of health infrastructure. In the present scenario, India has been the most affected country in the world followed by United States of America in terms of corona virus cases. The other countries which have higher numbers of COVID-19 cases as well as death tolls are Brazil, Italy, Spain, Russia, and UK. India is in the top among Asian countries to be hit hard by the pandemic followed by Iran, Iraq, Indonesia, Bangladesh and Philippines (Worldometer, 2020).

The increase in the incidence of COVID-19 cases and mortality has been observed on a daily basis in Asian countries due to their high population density. Being the largest and most populous continent on the earth, Asia reported around one fourth of the total COVID cases and high incidence of death. Though the deadly corona virus originated from one of the Asian countries i.e. China, it has been able to manage and control the perilous disease in the due course of time. But other Asian countries have been affected terribly as half of the world’s population is in Asia. Though the recovery rate is more than 89% still the death burden has become alarming for Asia.

The global economy is dependent on the Asian countries to a large extent as many fastest growing market economies have been emerging in Asia. This has a greater influence on the world economy due to its major share of contribution to the growth rate in terms of production and consumption. As the trend of COVID-19 cases and deaths in Asia has been showing steeply increasing, it is indeed significant to study the factors determining the COVID deaths from a social and economic perspective. Worldwide studies have been continuing to analyse the trend, pattern and determinants of COVID-19 cases and fatalities. Despite many such studies, factors determining fatalities among nations and the methods to control the disease have not been much explored. Some studies have verified the importance of clinical factors such as old age, lack of immunity, obesity, smoking, inadequate hospital care etc. on COVID related fatalities (Wang et al., 2020). However, apart from clinical characteristics, there are other socioeconomic determinants such as, health care infrastructure, size of urban population, social capital in terms of public participation and magnitude of poverty which can determine COVID-19 related mortality across regions. Social determinants of health have crucial role to play in explaining differential mortality rates of COVID-19. There is a need to consider resource allocations and policy decisions on operational needs at county levels (Paul et al., 2021). Social factors contributed to COVID-19 death significantly for Black Americans at the county level (Dalsania et al., 2022). Yanagisawa, Kawachi, Scannell, Oronce, and Tsugawa (2021) observed the importance of social and emotional support and individuals’ commitment to social institutions on lowering COVID related deaths. Given this background, the present study is an attempt to look into the trend and pattern of death burden of COVID 19 and important factors which have rampantly contributed to the corona virus cases and deaths leading to serious health concerns and economic trouble.

The rest of the work is structured in four sections. Review of relevant literature pertaining to COVID-19 related death burden and its associated issues is provided in section two. Data and empirical framework of study are explained in section three. Section four presents the empirical findings and discussions with a conclusive remarks and policy suggestions provided in section five.

2. Review of selected literature

Studies pertaining to COVID-19 cases, fatalities and its implications are growing across the countries. An attempt has been made in this context to examine the relevant literature on COVID-19 cases, death burden and its determinants. Varkey et al. (2020) studied about the determinants of COVID-19 positive cases in Asian countries and found out that net migration rate, higher per capita gross national income and high incidence of poverty have positive impact on the increase of new COVID cases in Asian countries. Richardson et al. (2020) from a study among COVID patients in New York City, found obesity, diabetics and hypertension were the common comorbidities. Demographic, environmental, and healthcare factors are very important to explain the COVID deaths. However, population aging, air pollution, humidity, COVID-19 prevalence, ordinary beds saturation, and critical care are positively associated with the fatality rate (Perone, 1920). Factors that positively contribute to the mortality rate include larger share of ageing population above 65 years of age, high obesity rate, and urbanization (Squaili, 2020, pp. 1–14). Adults aged over 70 and those with comorbidities such as respiratory and cardiovascular diseases and cancer are at high risk to death in the United Kingdom. Jordan et al. (2020) have observed that age with comorbidities has increased risk of COVID mortality. The population thickness and unhygienic living conditions are uncritically associated with the spread of COVID-19 infections and deaths in South Asia (Aliaf, 2020).

The COVID-19 mortality in India is under reported. However, the major factors associated with mortality rate in India are high rate of diabetes, inadequate preparedness and the suboptimal level of health care (John & Seshadri, 2020). Panneer et al. (2022) highlighted on the impact of COVID-19 and lockdowns in India through a systematic review. Ranjan and Muraleedharan (2020) observed that the elderly population in India are more vulnerable to COVID-19. Chronic non-communicable diseases, diabetes and hypertension are highly prevalent among the elderly population which further increases their vulnerability to COVID-19 death. Along with this, the social determinants are more crucial in determining the vulnerability of the elderly people during the pandemic. In urban counties, population density is significantly correlated with high death rate. In non-urban counties with more agricultural workers, high levels of poverty and more elderly people have significantly higher levels of mortality (Fielding-Miller et al., 2020). COVID-19 related mortality in United Kingdom was highly related with male patients, ageing and deprivation. Similarly patients with comorbidities are at a higher risk (Williamson et al., 2020). Holman et al. (2020) observed higher risk factor and COVID-19 fatality rate among people with type 1 and type 2 diabetes in England.

In the first few months of the pandemic, counties having higher bonding in terms of social capital experienced lower mortality per one lakh population. Lesser excess deaths were seen by the communities having strong close-knit social ties (Fraser et al., 2021). Lower perceived stress was associated with greater social support. Social capital in different forms can effectively reduce stress which will be helpful to maintain a healthy and better lifestyle away from unexpected or unavoidable stressful life events such as the on-going COVID-19 pandemic (Jean-Baptiste et al., 2020). Social capital can be helpful in designing right strategies to address effects of technological disasters on community (Ritchie & Gill, 2007). Social capital has a significant association on the number of infections and spread of virus and therefore increasing investment in this sectors would help in checking negative shocks (Makridis & Wu, 2020). High social capital in communities better ensure that the entire community is supported in the most efficient way. It facilitates for community level monitoring to check transmission (Borgnovi et al., 2020). COVID-19 deaths are affected both positively and negatively by dynamics of social capital related factors (Imbulana Arachchi & Managi, 2021). Dint et al. (2020) analyzed the role of community engagement and individual commitment to social institutions in designing health policies. Yanagisawa et al. (2021) highlighted on the differential health impacts of social and emotional support, and that of voter turnout ratio on COVID burden. Panda et al (2022) in their volume tried to address the impact of COVID-19 on health, economy and society and various factors associated with COVID through seminal contributions by various authors.

Besides, health infrastructure in terms of hospital beds, manpower in health sector and availability of critical supplies including medicines and vaccines are important in preventing death. Rout and Panda (2007) have highlighted on multi-dimensional household specific and
government specific determinants of health including Public investment and social practices.

From the above literature, it is observed that the factors like comorbidities, old age, un-hygienic living condition of the people, obesity and urbanization are highly associated with COVID-19 mortality rate. The role of social capital in minimizing coronavirus fatalities has also been studied but mostly they are limited to United States. However, there are many other factors that are responsible for determining the COVID-19 deaths which are not highlighted in the above studies. The factors like health infrastructure, Government’s approach in stringency measures, and peoples’ participation in terms of adhering lockdown, social distancing and sanitary practices in health care management significantly contribute in determining COVID-19 related deaths. Not many studies have explored the factors associated with death burden in Asian countries which is the largest populous continent in the world. So, this paper tries to look into these issues for a comprehensive study to determine the factors responsible for death burden of COVID-19 in the Asian countries.

3. Data and methodology

Secondary data have been used from various sources like our world in Data, United Nations Development Programme and the Institute for Demographic and Electoral Assistance for analysis. The study includes 45 Asian countries for graphical analysis based on the availability of data. The countries include Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei, Cambodia, China, Georgia, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Laos, Lebanon, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, South Korea, Sri Lanka, Palestine, Syria, Tajikistan, Thailand, Timor, Turkey, United Arab Emirates, Uzbekistan, Vietnam and Yemen. But, for the regression analysis only 32 countries such as Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Georgia, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Laos, Lebanon, Myanmar, Nepal, Oman, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Tajikistan, Thailand, Turkey, Uzbekistan, Vietnam and Yemen have been included considering the availability of data for all variables. The time period for the pattern analysis (May to October 2020) was decided specifically to cover the first wave of the pandemic. For the graphical analysis we used data of six months to show a time series plot of the fatalities in Asia. It was during this period that many Asian countries reached a peak with a maximum number of cases and later on the cases started declining.

This paper has been developed in the lines of Squalli (2020, pp. 1–14). In order to understand the death burden for Asian countries, we have used total death per million and total death as a percentage of total cases as the dependent variable. Based on daily data up to 25th October 2020 pattern analysis has been performed. The study has also employed regression technique in a cross-sectional framework to examine the determinants of COVID-19 fatalities in Asian countries. The socio-economic variables used in the study are per capita GDP, net migration, old age population covering age group of 65 and above, number of hospital beds, stringency index, and voter’s turnover ratio. In addition, a co-morbidity factor like the diabetes prevalence rate has been used in the analysis. The variables have been described in the table –1.

The reasons for the selection of variables were based on its relevance in determining the mortality rate. Health infrastructure has played an important role in reducing the mortality rates associated with the virus. Better infrastructure would help tackle the crises and it is hypothesized to be negatively associated with COVID related mortality. Country with larger size of aged population is more vulnerable to COVID infections and death. Old age dependency ratio is used as a proxy to capture the size of aged population and is included in the model.

Social capital through community participation and adhering to the

| Table 1 Description of variables. |
|-----------------------------------|
| Variable                        | Abbreviation | Description                                                                 | Unit       | Source                                           |
| Total death cases per million   | DPCM         | Total COVID19 death cases per million population                            | Ratio      | Our world in data                               |
| Deaths cases as a share of total cases | DCTC         | Total death cases as a share of total cases                                | Ratio      | Our world in data                               |
| Per capita gross national income | PCGI         | The per capita income divided by the total population in a country          | Ratio      | United Nations Development Program(UNDP)         |
| Old age dependency ratio       | ODR          | the number of population in the age group 65 and above to the total population | Ratio      | Our World in Data                               |
| Voters’ turnout ratio          | VTR          | Number of voters casted vote as a percentage of the total eligible voters   | Ratio      | Institute for Demographic and Electoral Assistance (IDEA). |
| Diabetic prevalence rate       | DPR          | Diabetes prevalence refers to the percentage of people ages 20–79 who have type 1 or type 2 diabetes | Rate      | Our World in data                               |
| Number of hospital beds        | HB           | Total number of hospital beds per thousand                                   | Number     | Our World in Data                               |
| Stringency index               | SI           | An index scaled to 0 to 100 that includes travel bans, school closure and work place closure | Index     | Our World in Data                               |
| Urbanisation                   | UR           | Urban population share in total population                                  | Percentage | Our World in Data                               |

Source: Compiled by Authors from Our World in data, UNDP and IDEA

lockdown norms have been important in reducing the COVID positive cases and mortality rate associated with the virus. Very specifically, voters’ turnout ratio (VTR) has been used as a proxy for people’s participation and collective action. In the absence of direct data for social capital, VTR is used as a proxy for Social capital. It measures the level of people’s participation in democracy, public activities and awareness. This may also help to indicate people’s participation in creating awareness about Covid appropriate behaviour in the society. But countries in the Asian countries have varied social setup and different political systems starting from full scale democracies to semi-dictatorships. However, main purpose of including VTR is to draw preliminary inferences of social capital on Covid related mortality. For the countries where, VTR data are not available, they are excluded from regression analysis. Though VTR is used as crude proxy for social capital in the present study, future study may try to construct an appropriate index for social capital in order to overcome the weaknesses and see its influence on managing on health emergencies and related mortality.

Comorbidty is another factor which may possibly influence fatalities associated with COVID. One of the important comorbidities is prevalence of diabetic. Diabetic prevalence rate is used to control for comorbidity factor in explaining COVID related mortality. The study has also used a stringency index that is calculated by “Our world in data” to account for the restrictions implemented to check the spread of the disease and its fatality rate.
In order to understand the degree of association across the independent variables the correlation matrix has been computed and the same is reported in Table 4. It is observed that per capita gross national income has high degree of correlation with both the diabetes prevalence rate and urbanisation; as a result the same has been omitted from the model estimating the determinants of COVID related fatalities.

The cross-sectional model in its general form has been given below

$$\ln \text{TDCPM}_i = HB_i + NM_i + ODR_i + VTR_i + CVD_i + DPR_i + SI_i + UR_i + U_i$$  

$$\text{NDPM}_i = HB_i + NM_i + ODR_i + VTR_i + CVD_i + DPR_i + SI_i + UR_i + U_i$$

The description of all variables mentioned in equation (1) and equation (2) is provided in Table 1 and descriptive statistics of the variables used are provided in Table-5. While equation-1 explains the determinants of total deaths per million, equation-2 finds the factors for new deaths per million populations. The first model is used in a log-linear (Semi-log) model, whereas in the second one we couldn’t take log because for some countries, the new deaths per million population were zero. Ordinary least square technique is adopted to estimate the regression coefficients. The correlation matrix and variance inflating factor have been used to detect the influence of multicollinearity among the independent variables (Table 8). From the Table-6 and Table-7, it is observed that there is presence of heteroscedasticity in the data set. To correct for the existence of heteroscedasticity, robust standard error has been used.

4. Results and discussion

In this section an attempt is made to analyse the COVID-19 related death burden of each region of Asia visa-vis Asian region as a whole. Asian countries are segregated in the regions in lines with Asian Country Research @ Pitt: Regions of Asia. It is also in similar lines to the United Nations statistics division’s scheme of sub-regions. The details of classification are provided in appendix Table-9. Besides, factors determining

![Fig. 1. Share of each Asian region COVID-19 fatality cases in total fatality in Asia. Source: Compiled by authors from “Our world in Data” as on October 25, 2020](image1)

![Fig. 2. Share of each Asian region fatality cases per million populations to total fatality cases per million population in Asia. Source: Compiled by authors from “Our world in Data” as on October 25, 2020](image2)
the COVID-19 fatalities have been identified in subsection-2. Figure-1 shows the share of each region’s fatality cases to total fatality cases in Asia caused by COVID-19.

It is observed from the figure-1 that the fatality share of the regions such as Central Asia, Eastern Asia, South-Eastern Asia, Southern Asia, Southwest Asia, and Western Asia were 1.69%, 2.96%, 8.77%, 71.43%, 0.26%, 14.89%, respectively. The fatality burden in Southern Asia is considerably higher, followed by Western Asia, and South-Eastern Asia. Figures for Eastern Asia, Central Asia, and Southwest Asia are negligible. The main possible reasons of relatively higher death vulnerability in Southern Asia to COVID-19 are population density, poor health infrastructure, and challenges of implementation of COVID-appropriate behaviour.

The study has examined the fatality burden of each Asian region, giving due weightage to the population. Fig. 2 shows the share of each Asian region in fatalities per million populations to total fatalities per million populations in Asia.

Fig. 2 shows the shares of each region’s fatality cases per million population to total fatality cases per million populations. The percentage for Central Asia, Eastern Asia, South-Eastern Asia, Southern Asia, Southwest Asia, and Western Asia is 9.1%, 0.74%, 3.79%, 20%, 0.58%, and 65.79%, respectively. Western Asia has a vast fatality burden, followed by Southern Asia, Central Asia, South-Eastern Asia, Eastern Asia, and Southwest Asia when weightage for the population is concerned. While taking population into account to examine the fatality burden of COVID-19, the study found different results. South Asia had the highest burden of fatality, but while taking the share of the population, Western Asia had a more fatality burden.

Fig. 3 highlights the shares of confirmed cases to total confirmed cases of Asia for Central Asia, Eastern Asia, South-Eastern Asia, Southern Asia, Southwest Asia, and Western Asia, which are 2.13%, 1.63%, 6.42%, 71.72%, 0.02%, 18.09% respectively. Southern Asia is the highest contributor to COVID-19 cases in Asia, followed by Western Asia, South-Eastern Asia, Central Asia, Eastern Asia, and Southwest Asia. The study has tried to examine the same per million population shown in Fig. 4 to understand the fatality burden of COVID-19 on the Asian region.
in relative terms.

Fig. 4 shows the shares of confirmed cases per million population to total confirmed cases per million population of Asian regions like Central Asia, Eastern Asia, South-Eastern Asia, Southern Asia, Southwest Asia, and Western Asia are 5.34%, 0.39%, 4.37%, 12.46%, 0.02%, 77.42% respectively. When the population is considered, the share of COVID cases in Western Asia is extremely high, followed by Southern Asia, Central Asia, South-Eastern Asia, Eastern Asia, and Southwest Asia.

Fig. 5 depicts the percentage share of Asian region fatality cases to total fatality cases of Asia from 17th May 2020 to 25th October 2020. There is a decline in the share of fatality cases to total fatality cases in Asia for Central Asia, Eastern Asia, Southwest Asia, and Western Asia. Further, there is an increasing pattern in South-Eastern Asia and Southern Asia for the same period. However, it has been observed that there is a sharp decline in Eastern Asia and Southwest Asia in percentage share.

Fig. 6 shows the percentage share of fatality cases to total confirmed cases of Asia and total fatality cases to total positive cases in Asia from 17th May 2020 to 25th October 2020. There is a declining share of total fatality cases to total positive cases in Asia. Eastern Asia and Southern Asia follow the same pattern. Central Asia has a lesser percentage share of fatality cases than the total positive cases of Asia between 17th May to 17th July 2020. There is an increase in fatality cases’ percentage share to total positive cases in Asia, but eventually, it stagnates. Furthermore, in the case of South-Eastern Asia, Southwest Asia, and Western Asia the percentage share were constant throughout. However, Southwest Asia shares a considerable percentage of fatality cases to total positive cases of Asia compared to other Asian regions.

Fig. 7 shows the fatality case per million population for the Asian region from 17th May 2020 to 25th October 2020. There is a fluctuation...
Fig. 7. Fatality case per million population for the Asian region.
Source: Compiled by authors from ‘Our World In data’ for the period of 17th May 2020 to 25th October 2020

Fig. 8. Fatality case per million populations for Asia as a whole.
Source: Compiled by authors from ‘Our World In data’ for the period of 17th May 2020 to 25th October 2020

Fig. 9. Share of fatality cases to total fatality cases in Asia (Five Most affected countries by Covid-19, death burden).
Source: Compiled by authors from ‘Our World In data’ for the period of 17th May 2020 to 25th October 2020
in fatality cases per million for Central Asia, South-Eastern Asia, Southwest Asia, and Western Asia initially, and later a steady pattern for the same. Furthermore, there is a sharp decline in the fatality cases per million population in Eastern Asia. South Asia shows an upward trend in fatality cases per million population.

Fig. 8 shows Asia’s fatality cases per million population from 17th May 2020 to 25th October 2020. The fatality case per million population

| Table 2 |
| --- |
| **New Deaths Per million as the Dependant Variable(Model 1).** |
| Variables | Coefficients |
| HB | -0.2713509 (-1.74) |
| UR | 0.0538392 (2.01) |
| VTR | -0.0369079 (-1.79) |
| SI | -0.0445875 (-0.97) |
| DPR | -0.3088225 (-1.94) |
| C | 6.44 (1.77) |
| R squared | 0.34 |
| F statistics | 3.04 |
| No of observation | 32 |

*a* @5% level of significance.

* @10% level of significance.

Source: Authors’ calculation using Stata using data from “Our world in data”, UNDP and IDEA as on 25th October 2020

| Table 3 |
| --- |
| **Total deaths per million populations (Model 2).** |
| Variables | Coefficient (t-stat) |
| HB | -0.3108965 (-0.99) |
| UR | 0.0177438 (1.16) |
| VTR | -0.0581178 (-3.14) |
| SI | 0.0215584 (1.12) |
| DPR | 0.0065915 (0.07) |
| C | 5.27 (3.28) |
| R squared | 0.46 |
| F statistics | 3.05 |
| No of observation | 32 |

***@10% level of significance.

* @1% level of significance.

Source: Authors calculation using Stata Authors‘ calculation using Stata using data from “Our world in data”, UNDP and IDEA as on 25th October 2020

in Asia is increasing at an increasing rate over the study period.

Fig. 9 shows the share of fatality cases in selected countries to total fatality cases in Asia. Fig. 9 calculates the percentage share of the country’s death cases to total death cases in Asia on 25th October 2020. It has been observed that India, Iran, Iraq, Turkey, and the Philippines are five countries that had a significant percentage share of day-wise death cases to total death cases in Asia. Together, these countries contribute 76.24% of death cases to total death cases in Asia as of 25th October 2020.

Fig. 10 shows the share of confirmed cases of selected countries in total confirmed cases of Asia. Fig. 10 shows the percentage share of the country’s confirmed cases day-wise to the total confirmed cases in Asia on 25th October 2020. India, Iran, Iraq, Bangladesh, and Indonesia are
The study has analyzed the pattern of COVID-19 death burden in Asian region and different factors that contribute to the fatality rates of the virus. It has been observed that among different regions in Asia, Southern Asia contributes the highest share of fatality cases in total fatality cases of Asia with 71.43%. It also has the highest share of confirmed cases in total confirmed cases of Asia with 71.72%. However, when we take the population into account, then Western Asia leads fatality cases per million population to total fatality cases per million populations.

As heteroscedasticity is present in the data set, heteroscedasticity corrected robust SE is used. The coefficient estimate of health infrastructure represented by the number of hospital beds found to be negative and statistically significant. The countries in Asia having better health infrastructure have been able to reduce daily new deaths per million populations. Another potential predictor of new death is found to be voter’s turnover ratio (VTR) which is used as a proxy for social capital. The coefficient of VTR is negative and significant. It shows how people’s participation through community development programmes and increased awareness has helped in reducing the fatality rate of COVID-19. Higher social capital is associated with higher social responsibility. These countries therefore experience voluntary measures like hand sanitising and social distancing to help reduce the incidence and the fatality rate of the virus. Stringency Index did not emerge to be a bigger challenge considering its population and size of informal activity. As a result, the coefficient of stringency index seems to be insignificant in predicting new death per million populations in Asian countries.

Urbanisation has a positive significant relationship on the death burden. Countries in Asian region with larger urban population have higher daily new death cases. Similar results are found in earlier studies. Countries having a higher proportion of urban population had a higher disease burden (Gupta et al., 2020). 90% of the cases reported are in urban areas that are epicentre of the pandemic (United Nations,2020).

A greater risk of COVID-19 is seen in patients who are diabetic. The fatality rate was much higher for patients that are diabetic than those patients who do not have any comorbidity factors. In the present study result is contrary and diabetic prevalence rate (DPR) has negatively significant relationship on the fatality rate of the virus. Some studies have confirmed for the heterogenous outcomes that the pandemic has bought forward and therefore difficult to give a conclusive relationship between the fatality rate and COVID-19 (Barrera et al. (2020)).

Table 7
Breush Pagan test for Model 2.

| Ho: constant variance | Variables: fitted values of total death per million |
|-----------------------|----------------------------------------------------|
| Chi square            | 10.60                                      |
| Prob > chi square     | 0.0011                                    |

Source: Authors’ calculation using Stata

Table 8
Variance inflating factor.

| Variable | VIF | 1/VIF |
|----------|-----|-------|
| UR       | 2.12| 0.472176 |
| DPR      | 1.76| 0.569696 |
| HB       | 1.54| 0.649981 |
| SI       | 1.22| 0.820682 |
| VTR      | 1.08| 0.928963 |

Source: Authors’ calculation using Stata

five countries that have the largest percentage share of day-wise confirmed cases to total confirmed cases in Asia. These countries accounted for 73.61% of confirmed cases to the total confirmed cases in Asia on 25th October 2020. Determinants of death burden.

In the lines of methodology and variables outlined in the section – 3, regression coefficients of new deaths per million populations and total deaths per million populations are shown in Table 2 and Table 3 respectively.

Table 2 shows the model with new death per million populations as the dependant variable as on 25th October 2020.

As heteroscedasticity is present in the data set, heteroscedasticity corrected robust SE is used. The coefficient estimate of health infrastructure represented by the number of hospital beds found to be negative and statistically significant. The countries in Asia having better health infrastructure have been able to reduce daily new deaths per million populations. Another potential predictor of new death is found to be voter’s turnover ratio (VTR) which is used as a proxy for social capital. The coefficient of VTR is negative and significant. It shows how people’s participation through community development programmes and increased awareness has helped in reducing the fatality rate of COVID-19. Higher social capital is associated with higher social responsibility. These countries therefore experience voluntary measures like hand sanitising and social distancing to help reduce the incidence and the fatality rate of the virus. Stringency Index did not emerge to be a bigger challenge considering its population and size of informal activity. As a result, the coefficient of stringency index seems to be insignificant in predicting new death per million populations in Asian countries.

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Table 9
Classification of Asian countries.

| Central Asia | Kazakhstan | Kyrgyzstan | Tajikistan | Uzbekistan | Eastern Asia | China | Japan | Mongolia | South Korea | South-Eastern Asia | Brunei | Cambodia | Indonesia | Laos | Malaysia | Philippines | Singapore | Thailand | Timor | Vietnam | Southern Asia | Afghanistan | Bangladesh | Bhutan | India | Iran | Iraq | Israel | Jordan | Kuwait | Lebanon | Oman | Palestine | Qatar | Saudi Arabia | Syria | Turkey | United Arab Emirates |
|-------------|------------|------------|------------|------------|-------------|-------|-------|----------|-------------|-------------------|--------|----------|-----------|-----|----------|-------------|----------|----------|-------|--------|------|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|--------|--------|--------|--------|

Source: Compiled by authors from Asian Country Research @ Pitt: Regions of Asia

An alternate model has been specified with total death per million population as the dependant variable as on 25th October 2020. As heteroscedasticity is present in the data set, heteroscedasticity corrected robust SE is used. Results are shown in Table 3. The only variable that was significant in the analysis is the voter’s turnover ratio. Public participation tends to have a negatively significant relationship with total deaths per million.

5. Conclusion

The study has analyzed the pattern of COVID-19 death burden in Asian region and different factors that contribute to the fatality rates of the virus. It has been observed that among different regions in Asia, Southern Asia contributes the highest share of fatality cases in total fatality cases of Asia with 71.43%. It also has the highest share of confirmed cases in total confirmed cases of Asia with 71.72%. However, when we take the population into account, then Western Asia leads fatality cases per million population to total fatality cases per million.
population of Asia as well as share of confirmed cases per million population to total confirmed cases per million of population in Asia as compared to other Asian regions.

The factors like health infrastructure and voters’ turnout ratio are found to be significant and potential in reducing the new deaths per million populations. Though the coefficient of Stringency index has been negative and it did not emerge to be significant in Asian countries. The COVID related fatalities in Asian region are urban centric and urbanization proxy is found to be positive and significant. Diabetes prevalence rate has some heterogeneous result and in the present study its coefficient is not in the hypothesized direction.

The Countries should ramp up health infrastructure and necessary preparedness to deal with the subsequent waves and COVID related fatalities. Importance needs to be given people’s participation and their shared responsibilities in dealing with COVID cases and checking on fatalities. The realisation of social responsibility among the masses can lead to community participation and adhering to the protocols imposed by the government and help in checking on spread of virus and associated death.

**Funding**

No funding support received for this research.

**Conflicts of interest**

No conflict of interest.

**Author contributions**

Conceptualization: P.K.P., Review of literature: A.K.M. and S.R.P., Data curation: P.R., S.R.P. and R.S.V., Methodology: P.K.P., and R.S.V., Visualization: P.R.S.R.P., and P.K.P., Formal analysis: P.K.P, R.S.V. and P.R. Supervision: P.K.P., Validation: P.K.P., R.S.V., P.R., Writing - original draft: P.K.P., R.S.V, P.R, A.K.M.and S.R.P., Review and editing: P.K.P. All authors have read and agreed to published version of manuscript.

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