

Puzzling increase and decrease in COVID-19 cases in Pakistan

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Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and is rapidly spreading worldwide, leading to massive loss of life [1,2]. At present, the numbers of COVID-19 cases are still soaring. As of 2 September 2020, a total of 25.6 million COVID-19 cases have been confirmed globally, with 0.85 million deaths [3]. Pakistan, a developing country in Asia geographically connected to China, Iran, India and Afghanistan, faces a big challenge with COVID-19. Currently 0.29 million cases have been confirmed in Pakistan, with 6318 deaths. In April 2020, Waris *et al.* [4] summarized in detail the preparedness of Pakistan at the federal, provincial and community levels to combat the inevitable COVID-19 outbreak. However, the effectiveness and efficiency of the social measures reported by Waris *et al.* need to be known in order to stop the spread of SARS-CoV-2.

The spread of SARS-CoV-2 in Pakistan is reflected by the numbers of confirmed COVID-19 cases. As shown in Fig. 1A, from 1 March to mid-August 2020, the COVID-19 pandemic in Pakistan developed in two distinct stages: an increase in cases, then a decrease. Both stages remain unexplained.

In the first stage, the numbers of COVID-19 cases kept increasing from 26 February, when the first case of COVID-19 was identified [5], until mid-June (Figs. 1A, 2A and 2B), although Pakistan undertook rigorous measures, including establishing

special hospitals, testing laboratories and quarantine centres; providing treatment; increasing public awareness; and ensuring the emergent response of local communities. For example, on 1 March 2020, only one new case was reported. However, on 13 June, over 6000 new cases were reported (Fig. 2A and B).

The government of Pakistan established a National Coordination Committee on 13 March 2020, chaired by a special advisor to the prime minister for health and population to formulate and implement a comprehensive strategy to stop the spread of SARS-CoV-2. After a National Coordination Committee meeting held on 1 April 2020, the government decided to extend its lockdown across Pakistan, which was extended twice until 9 May [6]. During the nationwide lockdown, gatherings of all kinds for social, religious or any other purpose at any public or private place were banned, and all educational establishments were closed. However, shops selling food, medicine or other essential items were exempted from the ban. Unexpectedly, this nationwide lockdown from 1 April to 9 May did not flatten the curve of COVID-19 cases in Pakistan (Fig. 1C). The incubation period for SARS-CoV-2 infection is 1 to 14 days, with a mean of 5.1 days (95% confidence interval, 4.5 to 5.8). Most individuals (97%) develop symptoms within 11.5 days of exposure (95% confidence interval, 8.2 to 15.6) [7]. We thus cannot explain why 39 days' nationwide lockdown did not reverse the increase in COVID-19 cases.

In the second stage, from mid-July to mid-August, COVID-19 cases were observed to be steadily decreasing, with a marked decline at the start of August (Figs. 1A, 2B and 2C). The same phenomenon was also noted in other countries in the region, including Bangladesh, Afghanistan and Iran (Figs. 1A, 2B and 2C), but not India, where the number of new cases was observed to be continuously rising (Figs. 1B, 2B and 2C) [3,8]. The reasons for this unexpected decline in COVID-19 cases in Pakistan remain to be explored. One possible reason is that Pakistan's people have multiple exposures to various vaccines, including oral polio vaccine and bacillus Calmette-Guérin vaccine (received by 90% of population), which may have resulted in a kind of nonspecific immunity. Other possible reasons include the high number of rural residents or the weather, with the hot summer season and/or high humidity slowing the spread of the virus [8,9].

As of 16 August 2020, the overall case-fatality rates in Pakistan (2.1%), India (1.9%) and Bangladesh (1.3%) were observed to be lower than that in other regional countries including China (5.2%), Iran (5.7%) and Afghanistan (3.6%) and major developed countries including the United States of America (USA, 3.1%), the United Kingdom (UK, 13%), France (14.9%), Germany (4.1%), Italy (13.9%) and Spain (8.3%)

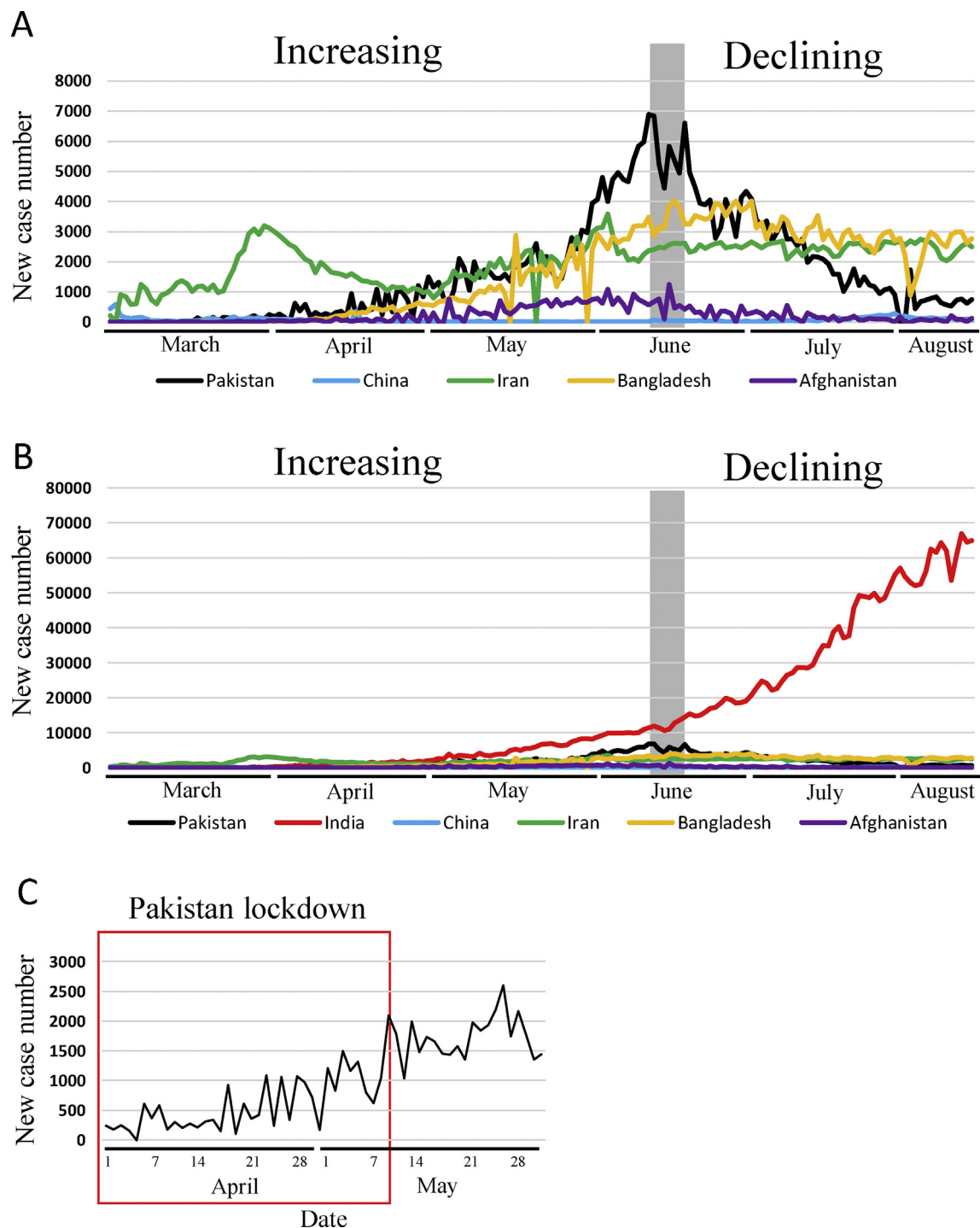


FIG. 1. Epidemic curve of laboratory-confirmed COVID-19 cases reported to World Health Organization (WHO) from 1 March to 16 August 2020 (169 days). (A) Numbers of daily new COVID-19 cases in Pakistan and regional countries excluding India. (B) Numbers of daily new COVID-19 cases in Pakistan and regional countries including India. (C) Numbers of daily new COVID-19 cases during Pakistan's nationwide lockdown from 1 April to 9 May.

(Fig. 3A). The lower case-fatality rate in Pakistan can also be seen in individual regions including Azad Kashmir, Balochistan, Gilgit-Baltistan, Islamabad, Khyber Pakhtunkhwa, Punjab and

Sindh (Fig. 3B). The reasons for the lower case-fatality rate have yet to be investigated. One of the possible reasons may be the age demographics of Pakistan. Pakistan's population is over 220

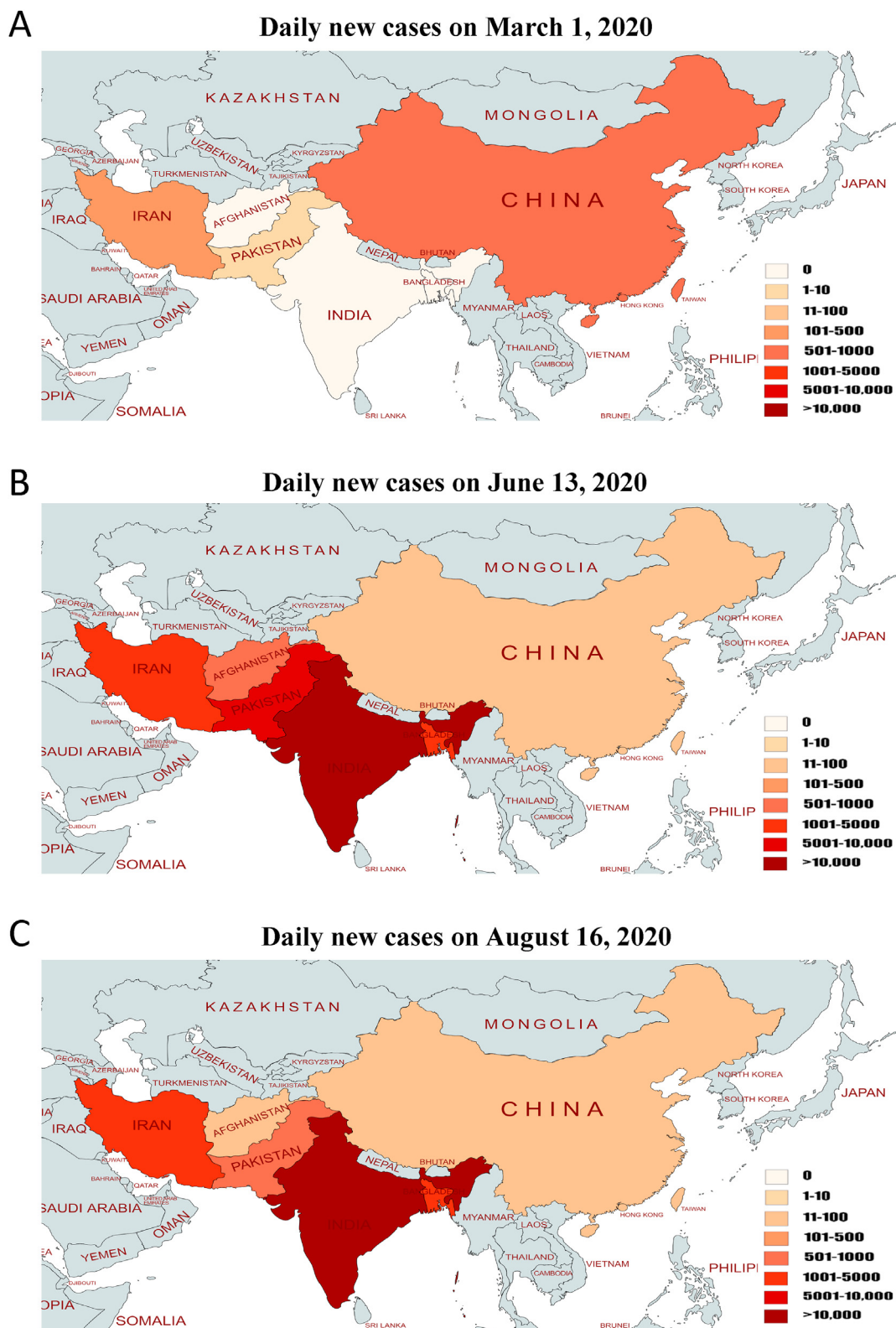


FIG. 2. Maps showing number of new COVID-19 cases in Pakistan and regional countries including China, India, Iran, Afghanistan and Bangladesh on 1 March (A), 13 June (B) and 16 August 2020 (C). Maps were made using MapChart (<https://mapchart.net>).

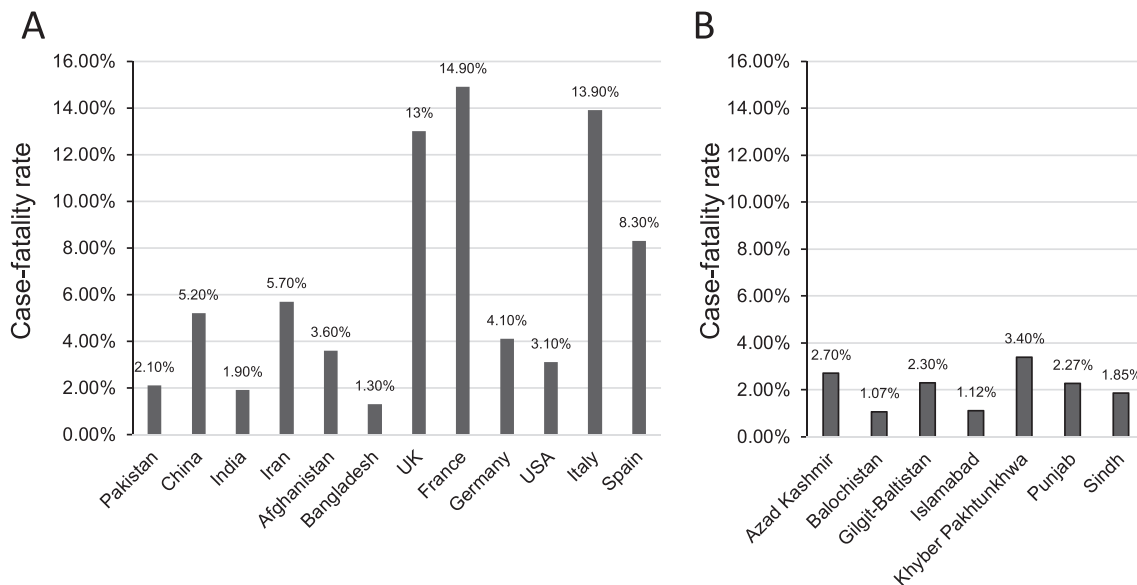


FIG. 3. Case-fatality rate in indicated countries (A) or in indicated regions in Pakistan (B). Case-fatality rate is ratio between confirmed deaths and confirmed cases in WHO database up to 16 August 2020.

million, with an estimated 64% under the age of 30 [10]. Globally, older individuals have proven to be more susceptible to COVID-19 [11].

In conclusion, although comprehensive social measures were taken at an early stage of the COVID-19 pandemic in Pakistan, our data indicate that the engagement of countermeasures needs to be reexamined to find the loopholes or defects in implementing policies in order to eventually win the war against COVID-19.

Conflict of interest

None declared.

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