

**LETTER TO THE EDITOR****Is the New Coronavirus Disease (COVID-19) Pandemic Halted by Malaria Epidemics?****Dear Editor**

Coronavirus disease 2019 (COVID-19) was first emerged in Wuhan, China in December 2019, and on March 11, 2020, WHO announced COVID-19 outbreak as a pandemic. Within less than 4 months on April 4, 2020, more than 1,100,000 people have been infected and the death rate passed 63,000 (5.7%) throughout the world (1). The disease is highly contagious and is thought to spread via direct contact or inhalation of respiratory droplets. Asymptomatic and presymptomatic carriers are substantial sources of transmitting the virus (2). After China, Europe, United States, Iran and South Korea are among the most infected areas, while malaria-endemic regions in Africa and South Asia have reported only few cases of COVID-19 so far (1). Given the infectious potential of the disease and the shortage of preventive facilities in low income countries, one recent article has warned about the unfortunate likelihood of a continental outbreak of COVID-19 in these countries (3).

Although it is intuitive that the delay in reaching the African countries was mainly because of low traffic between Africa and the rest of the world in compare to SARS or H1N1 (originating out of Africa), but with recent increasing global connectivity, it may not be a convincing reason. Also, the China's neighbor countries with malaria-endemic (i.e Viet Nam, Myanmar, Thailand, Cambodia, Lao PDR, and India) have reported relatively small numbers of COVID-19 patients according to the latest WHO reports (1). The first COVID-19 outside China was reported in Thailand on January 13, 2020, but the mortality of COVID-19 remained very low. Nigeria became the first sub-Saharan country to report a COVID-19 case but also this country did not report a high rate of mortality due to COVID-19 (4) [Table 1].

These countries have one aspect in common for being highly endemic for malaria. According to the latest world malaria report released in December 2019, 93% of malaria cases and 94% of its related deaths mainly occurred in 6 African countries including Nigeria, Democratic Republic of the Congo, Uganda, Cote d'Ivoire, Mozambique and Niger. South Asia and Eastern Mediterranean regions are the other main malaria-endemic regions (5). Although WHO technical advisory group in 1990-2005 changed its recommendation in malaria-endemic countries from a single dose chloroquine (CQ) to the Artemisinin

**Table 1. Total number of COVID-19 cases and related deaths toll until April 4, 2020.**

Country	Infected cases	deaths
United States and Europe and Iran		
United States of America	273,880	7,087
Spain	124,736	11,744
Italy	119,827	14,681
Germany	91,159	1,275
France	65,202	6,520
Iran	53,183	3,452
TOTAL	727,987	44,759 (6.1%)
Countries with malaria epidemics		
Nigeria	190	2
Niger	98	5
Democratic Republic of the Congo	134	13
Congo	22	2
Uganda	45	0
Cote d'Ivoire	197	1
Mozambique	10	0
Madagascar	65	0
Somalia	5	0
Sudan	10	2
Central Africa Republic	8	0
Cameroon	306	7
Chad	8	0
Gabon	21	1
Mali	31	3
Mauritania	6	1
Burkina Faso	302	16
Guinea	52	0
South Sudan	1	0

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Table 1. Continued

Angola	8	2
Zambia	39	1
Senegal	105	0
Thailand	2,067	20
Myanmar	20	1
Combodia	114	0
Veit Nam	237	0
Lao PDR	0	0
India	2,567	72
TOTAL	6,668	149 (2.2%)

combination therapy (ACT) because of high rates of drug resistance, CQ is still commonly prescribed in these regions (6-8).

Because CQ is now one of the mainstay therapies of COVID-19 all over the world, we assumed that it may play a role in preventing COVID-19 in malaria-endemic countries. So, we decided to compare the distribution map of COVID-19 with areas at risk of malaria (9). In most African countries, malaria epidemic flare up starts in December of the respective year (10). As such, people routinely start to use CQ for malaria prophylaxis. At

the same time, COVID-19 emerged in the world. Total of 2682 cases of COVID-19 (only 0.7% of total infected cases worldwide) has been reported until recently in malaria endemic regions with mortality rate of only 1.1% compare to 4.5% worldwide [Table 1]. As chloroquine is mentioned as a possible preventive medication for COVID-19, monitoring those regions under malaria prophylaxis can help us better evaluate its preventive value.

There are other hypotheses or possibly myths for lower infection and even mortality rate including the role of race and ethnicity with lower infection rate among black race, and warmer climate in compare to the European counterparts. Other possible reason might be the lack of efficient detection and reporting systems, which was claimed by WHO that only 2 countries in Africa could test for COVID-19 in the beginning of the crisis (11). Moreover, we cannot overlook the possibility of later spread to these countries as COVID-19 is pacing from one region to another (12).

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