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COVID-19 epidemic in Libya

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ABSTRACT
The first case of COVID-19 was identified in Libya on 24/3/2020, and about 2 months later, the number of reported COVID-19 cases started to increase notably. The outbreak was first prominent in the southern region (Sabha) and then spread to the western and eastern parts of Libya. By 24/12/2020, the reported total number of deaths from COVID-19 reached 1415. There seems to be no published data on the size of the epidemic in Libya. Here, we estimated the number of Libyans exposed to COVID-19 by using a COVID-19 mortality adjusted mathematical model for the spread of infectious diseases. We estimated that 14–20% of the Libyan population have been exposed to the COVID-19 pandemic. Thus, the risk of spread of COVID-19 infections during the coming months is high, and a considerable number of Libyans, particularly the elderly and people with chronic diseases, should be protected against COVID-19 infection. This is particularly urgent in the light of unofficial reports that the relevant healthcare facilities are under extreme stress.

1. Introduction

Libya is a North African country bordering the Mediterranean Sea. It has an area over two and a half times that of France but with an estimated population of only 6.8 million [1]. Since the armed conflict in 2011, Libya has been embroiled in various armed conflicts in various parts of the country. The fractured country was ill-prepared to meet the challenges of the COVID-19 pandemic. Despite that, before the identification of the first COVID-19 case in Libya, air travel was suspended, schools and universities were closed, and other preventive measures were taken starting on 16 March 2020.

The National Center for Disease Control in Libya (NCDC), which has branches in many cities and has managed to work on a national level, was tasked with overseeing the national effort to combat the COVID-19 pandemic. It publishes related information on its website (https://ncdc.org.ly/Ar/) and daily reports on its Facebook page about PCR-confirmed infections, deaths, recoveries and other information. However, there are no official reports or published studies on the estimated size of the epidemic in Libya and its impact in terms of mortality. Here, we address that issue.

2. Spread of COVID-19

Two months after identification of the first case of COVID-19, the number of cases confirmed by PCR

stood at 77 on 26 May 2020, with 3 deaths. After that, the number of confirmed infections and reported deaths rose more rapidly. By 31 July, there were 3691 confirmed cases and 80 deaths. This shift started soon after air flights began to arrive carrying Libyan citizens who had been stranded abroad after the suspension of flights, and a notable number of passengers were found to be infected. However, more notable is that the rise in the number of cases was initially more prominent in the less populous southern region. For example, Sabha, which has a population approximately one-tenth of that of the capital, Tripoli, had almost threefold more new infections than Tripoli (134 vs. 50) during the first 2 weeks after the beginning of that surge. This seems to have been associated with the challenges of practicing social distancing in a country abiding by the Arab socio-cultural communication norms, and in some regions more so than in others. In time, the epidemic was disseminated countrywide.

Proper assessment of the percentage of Sars-Cov-2 PCR test positivity early in the epidemic was not possible because this information was provided sporadically. Nevertheless, the records for the second half of June show a median positivity rate of 2.8%, with a substantial rise to 9.7% at the end of July, and a further rise to 22% starting 16/8/2020, but since the middle of November, it has fluctuated between 13% and 18%.

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3. Size of the COVID-19 epidemic in Libya

To estimate the size of the COVID-19 epidemic in Libya, we collected the data on COVID-19 mortality from the NCDC daily reports from the beginning of the epidemic until 24/12/2020. From those data, we estimated the number of cases by the classical Susceptible-Exposed-Infected-Recovered mathematical model of an infectious disease epidemic [2]. We fitted the model to an estimated infection fatality rate of 0.3% for the Libyan population [1,3–6]. Next, the size and evolution of the epidemic were simulated using the online epidemic calculator (https://gabgoh.github.io/COVID/).

The model estimated that 14% of the Libyan population (*i.e.*, about 930,000 individuals) have been exposed to the COVID-19 pandemic (Figure 1). By the end of April 2021, the estimated cumulative number of deaths due to COVID-19 will exceed 2200. However, high rates of under-reporting of death from COVID-19 have been described elsewhere [7]. With the assumption that COVID-19 deaths in Libya are under-reported by 30%, the model estimated that a total of 20% of the Libyan population (1.3 million individuals) have been exposed to the COVID-19 pandemic (Figure 2).

With the currently inadequate public health resources and information in Libya, the actual number
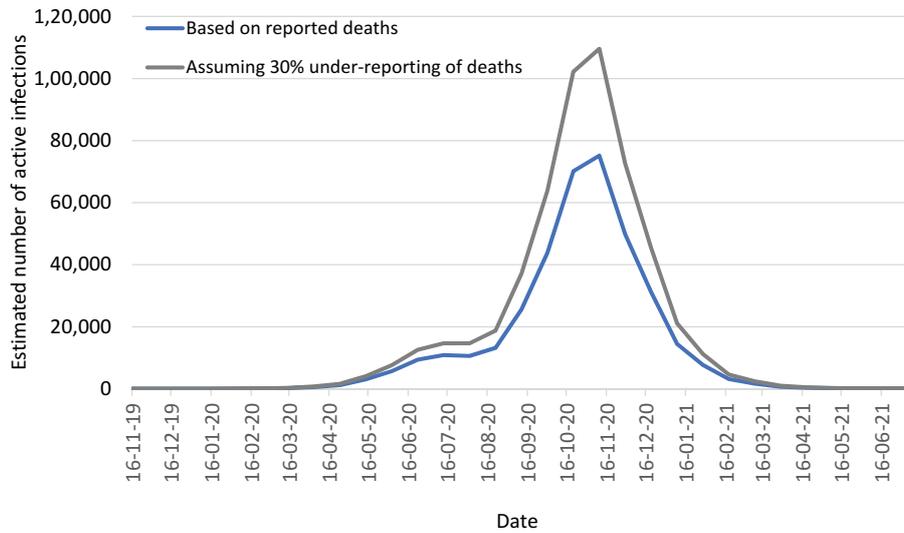

Figure 1. The estimated number of active COVID-19 cases over time based on two scenarios.
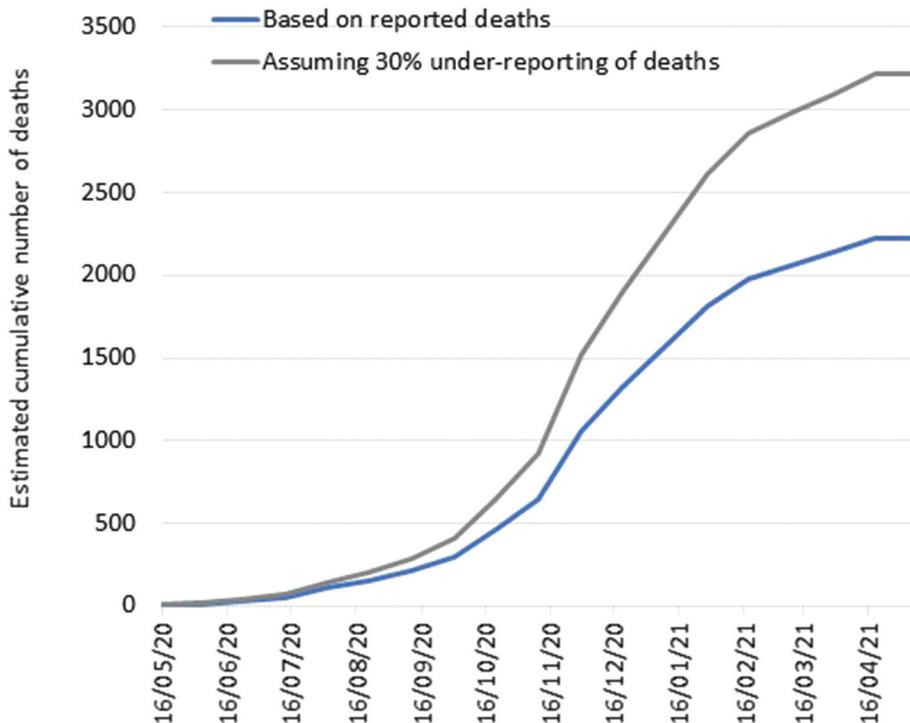

Figure 2. Cumulative number of COVID-19 deaths over time based on two scenarios.

of infections is highly uncertain. Moreover, how death due to COVID-19 is defined is unknown. We speculate that a significant number of deaths are unreported, especially among the elderly and in remote areas. However, the ages or age groups of those who died are not reported, which hinders assessment of that speculation.

The spread of infections and the extent of the COVID-19 epidemic in Libya is determined to some extent by socio-cultural customs, traditions, and adherence to physical distancing. However, the progress of the covid-19 epidemic in Libya will be also shaped by the public access to the mass vaccination program and the spread of the emergent new infectious variants.

4. Conclusion

We describe an approximate estimation of the size and evolution of the COVID-19 epidemic in Libya based on mortality data and the classical mathematical model of an infectious disease epidemic. About one-fifth of Libyans have been exposed to the COVID-19 pandemic. Therefore, a considerable number of high-risk individuals need to be shielded against COVID-19 infection by vaccination or by maintenance of precautionary measures for several months.

Author contributions

OB: conceived the study. AB: collected data. Both authors participated in data analysis, manuscript writing and review, and approval of final version.

Disclosure statement

The authors declare no conflict of interest.

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