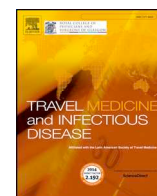




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## Modelling the epidemic spread of COVID-19 virus infection in Northern African countries

Dear Editor,

Since its discovery in China over three months ago, Coronavirus Disease 2019 (COVID-19) has caused great concern particularly within overlapping countries where borders cannot be easily controlled. In February this year, COVID-19 has embarked in Northern African countries including, Egypt, Libya, Tunisia, Algeria, Morocco [1]. Devastated infrastructures complicated with political instability and lack of experience form fighting epidemics by the national authorities of this region may added to the late response to COVID-19. Thus the death cases are likely under-reported as many infected cases have not progressed to the critical stage [2]. The first case was reported in Egypt (February, 14 th) followed by Algeria (February 25 th) and then Morocco and Tunisia at the same day (March 2 nd) and lately by Libya on March 25 th. It is of crucial importance hence then, to estimate the number of initial cases at an early stage of the outbreak and make a prediction of new cases in this region to allow the implementation of proper policy to compact this contagious infection. Here in we evaluated the transmissibility of COVID-19 in the northern African region using the serial interval equal to that of COVID-19 in Wuhan, China, with a mean of 7.5 days and a standard deviation of 3.4 days [3,4].

The applicable model indicates that the North African region of 2019-nCov(COVID-19) may lead to a total of 1053 (95%CI: 317–1370) infections and 218 (121–315) deaths (Fig. 1A), corresponding to a fatality rate of 11.02% (9.26–12.78%). The initial transmissibility (basic reproduction number ( $R_0$ ), of COVID-19, at an early stage before intervention estimated (high estimate) to be 4.71 (4.50–4.92) when the epidemic started on 2 nd of February. However its effective reproduction number has dropped to reach 2.08 (2.01–3.18) as of 22th March 2020 (Fig. 1B). This trend will be steady for at least two months (60 [30–90] days) and it will decline gradually after this time. Comparable to the Chinese situation as quarantine and interventions are critically applied for curbing the epidemic immediately at the time of diagnosis [5]. The number of infected individuals is expected to peak in early May 2020 (80 days since initiation) with a peak population size of 795 (750–1200) infectious individuals in Northern Africa. This indicates that the transmission process experiences an effectively breaking point in contact and diagnosis rates.

Facing the rapidly rising epidemic in Northern African countries, integrated interventions have to be actively implemented. It is well known that the overall transmissibility of COVID-19 in community is very high as most introductions are followed by human-to-human

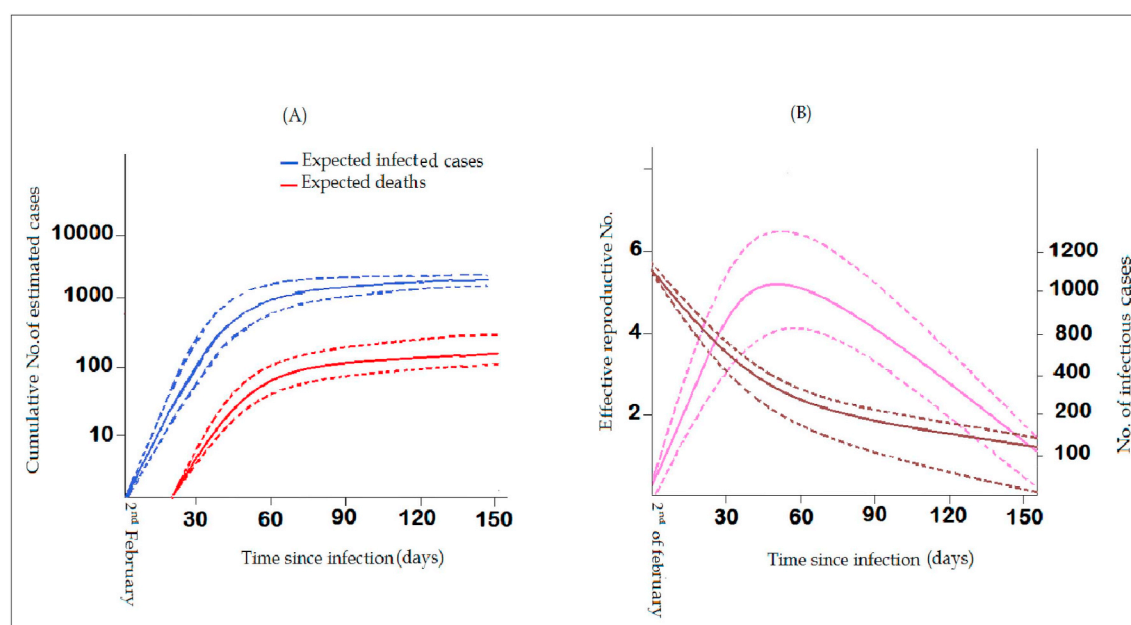


Fig. 1. Applicable dynamics model for; A- The cumulative number of infected and death cases in North African countries; the model is calibrated to reported data with 95% confidence intervals B- The effective reproduction number and the number of infectious individuals over time within North African countries.

transmission. Hence then, A quick diagnosis, the promotion of face mask use and reduction of travel, should be actively implemented. In addition to effective contact, tracing and isolation should be obligatory introduced and that all symptomatic cases are eventually reported. Local authorities should reduce the health-care surges, and limit geographical spread.

#### Declaration of competing interest

The author has no conflict of interest to disclosure.

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