

Spatiotemporal Integration of Tuberculosis and COVID-19 during the COVID-19 Pandemic in Libya.

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Short Report

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Abstract

Tuberculosis and COVID-19 infections have been traced in Libya during the first 28 epi-weeks and spatiotemporal analysis was carried to determine the patterns of the concurrence of these infections. The data indicated that despite the slight decline in TB notification, the two infections are intertwined and showed synergetic spatiotemporal patterns which vary geographically during the pandemic period. Adequate integrated interventions policy to contain the two co-occurring infections should be considered

Main Text

Tuberculosis (TB) and the newly emerging Coronavirus pandemic are expected to overlap. This will pose several public health challenges particularly in poorly developed countries with a high burden of TB (1,2). How COVID-19 will manifest itself in persons infected with TB is still uncertain and the impact of these pandemics on resource-limited nations remains unknown. However, it has been speculated that lesions associated with COVID-19 may increase the risk of TB and TB exposures increase the risk of morbidity and the mortality of COVID-19 (3,4). Therefore, a thorough understanding of the interactions between these infections is crucially important. Amongst many factors likely to affect the impact of COVID-19 in North African countries, co-infections with TB which need to be considered. Hence then, epidemiological studies of the prevalence of TB and COVID-19 in countries in which TB infection is common would be of great interest, but currently, no reliable data exists. Therefore, prospective cohort studies are needed to prove any causal association between the two diseases. Spatiotemporal analysis has been widely used to precisely locate the infected population. This will allow early identification of clusters and monitoring of local spread of disease across space and time. Daw *et al*, has used spatiotemporal analysis in tracing HIV and HBV in Libya over the last years. This will allow early identification of clusters and monitoring of local spread of disease across space and time, can support strategies that dynamically inform epidemiologists and decision makers, to ultimately enable targeted interventions at a local scale (5-7).

To investigate the epidemiological integration of TB and COVID-19 infections, we traced all the notified TB cases and the accumulative number of COVID-19 during the emergence of the COVID-19 pandemic in Libya. The time and spatial distribution of COVID-19 and TB cases were compared and the correlation between was determined. This was carried by displaying unique spatial trends for each epidemic (TB & COVID-19) using thematic mapping as previously described(5-7). The number of notified TB and the cumulative number COVID-19 cases were reported during the first twenty-eight epi-weeks of the pandemic spread as shown in Figure 1. Starting from March, 23th where, the first case was reported till October 5th, 2020 (8). A total of 41 686 COVID-19 cases were documented, during the first twenty-eight epi-weeks. Only 75 cases were reported in the first eight weeks, followed by 466 and 1247 cases during twelfth and sixteenth Epi-weeks respectively. On the twentieth epi-week (August) a sudden increase was noticed to reach the highest in September and October. During the same period, an average number of 177 TB cases were notified weekly during epi-weeks 1–8 and a mean number of 151 TB cases were notified weekly during the 28 th epi-week. The notification was gradually decreased in August and September 2020 to reach 15 % in October 2020. Indicating that the COVID-19 pandemic led to a decrease

in TB notification in Libya. This, however, is in agreement with other data published from South Korea and India (1, 9). Hence then adequate measures are need to be maintained and how these two infections may be integrated in universal programs should be planned to strengthen promptness of response to TB/COVID-19 pandemic. In this study, we analyzed the geospatial distribution of TB and COVID-19 during the epidemic period as illustrated in Figure 2. There is evident geographical regional variation of the two infections with in the country. The TB (Fig 2 A) was low in southern, eastern, and Southwestern regions, though it is high in West and Central regions particularly in certain cities including Tripoli, Sebha, and Benghazi. The geographic patterns of COVID-19 (Fig 2 B) were high in the West, Central, and Eastern regions. Although, it is moderate in the Southeast and Western Mountain regions. Hence then there is clear country-level variation in spatial patterns of TB and COVID-19.

Figure 3 illustrates a map displaying the relationship between TB and COVID-19 rates which indicates the possible a geographic combination between these two pandemics. The map portrays what appears to be high co-occurrence in certain locations of the study area. The southern region (i.e Sebah), Tripoli, and Benghazi consistently portrayed higher incorporation patterns of the two intertwined infections during the pandemic period. Conversely, the western mountain region and Southeast region of the study area exhibited a lower concordance. Therefore, in regions with high burdens of tuberculosis, maintaining a continuity of services and recovering programs should be a high priority to reduce the broader health impact of the COVID-19 pandemic. However, a less effective or poorly managed intervention could result in a high number of TB and COVID-19 deaths(1).

The strength of this study, it showed clear evidence of the spatiotemporal patterns of geographic co-occurrence of COVID-19 and TB. This highlights the interactions between these diseases which indicating a synergistic impact. Knowing that COVID-19 and TB could induce the development of severe lung disease and TB patients will have more time to get exposed to COVID-19 particularly in overcrowded populations. The study raises a major concern about the scale of the TB/COVID-19 pandemic in Libya and the uncertainty of preventive programs which actually disrupted not only the pandemic but also by ongoing armed conflict (7). Those, distributions will have a major impact on population health, especially over longer time periods. Therefore, more studies are needed to highlight the social, economic, and comorbidity burdens of these infections which to be considered in putting integrated intervention strategies to combat such combined pandemic (10

Declarations

Competing interests: The authors declare no competing interests.

References

1-Jain VK, Iyengar KP, Samy DA, Vaishya R. Tuberculosis in the era of COVID-19 in India. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 2020 Sep 1;14(5):1439-43.

- 2-Tadolini M, García-García JM, Blanc FX, Borisov S, Goletti D, Motta I, Codecasa LR, Tiberi S, Sotgiu G, Migliori GB. On Tuberculosis and COVID-19 co-infection. *European Respiratory Journal*. 2020 Aug 1;56(2).
- 3- Cronin AM, Railey S, Fortune D, Wegener DH, Davis JB. Notes from the Field: Effects of the COVID-19 Response on Tuberculosis Prevention and Control Efforts—United States, March–April 2020. *Morbidity and Mortality Weekly Report*. 2020 Jul 24;69(29):971.
- 4-McQuaid CF, McCreesh N, Read JM, Sumner T, Houben RM, White RG, Harris RC, CMMID COVID-19 Working Group. The potential impact of COVID-19-related disruption on tuberculosis burden. *European Respiratory Journal*. 2020 Aug 1;56(2).
- 5-Daw MA, El-Bouzedi AH, Ahmed MO, Cheikh Y. Spatial Distribution and Geographic Mapping of COVID-19 in Northern African Countries; A Preliminary Study. *J Clin Immunol Immunother*. 2020;6:032.
- 6-Daw MA, Daw AM, Sifennasr NE, Draha AM, Daw AA, Daw AA, Ahmed MO, Mokhtar ES, El-Bouzedi AH, Daw IM, Adam SI. Spatiotemporal analysis and epidemiological characterization of the human immunodeficiency virus (HIV) in Libya within a twenty-five year period: 1993–2017. *AIDS research and therapy*. 2019 Dec;16(1):1-9.
- 7- Daw MA, El-Bouzedi AH, Dau AA. Trends and patterns of deaths, injuries and intentional disabilities within the Libyan armed conflict: 2012-2017. *PloS one*. 2019 May 10;14(5):e0216061.
- 8-Daw MA. Preliminary epidemiological analysis of suspected cases of coronavirus infection in Libya. *Travel medicine and infectious disease*. 2020 Mar 20
- 9-Kwak N, Hwang SS, Yim JJ. Effect of COVID-19 on tuberculosis notification, South Korea. *Emerging Infectious Diseases*. 2020 Oct;26(10):2506.
- 10-Daw MA. Coronavirus infection in Syria, Libya, and Yemen; an alarming devastating threat. *Trav Med Infect Dis*. 2020 Apr 2;101652.

Figures

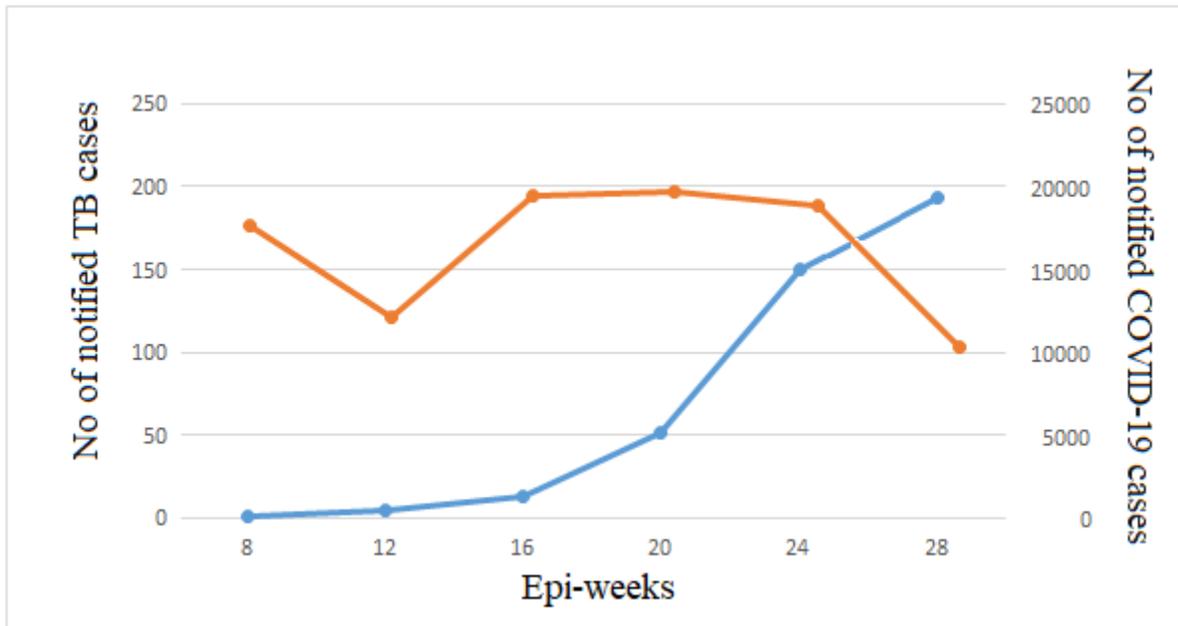


Figure 1

The number of Notified cases of TB (Yellow) and COVID-19 (Blue) during a 28 epi-weeks of COVID-19 in Libya.

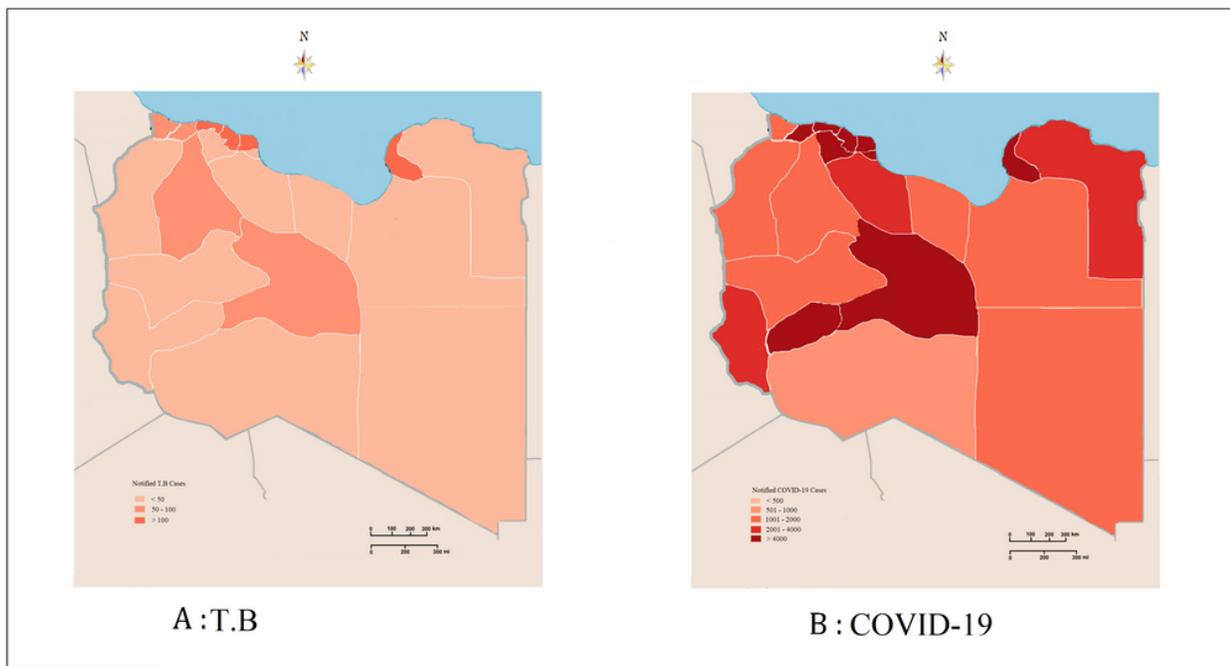


Figure 2

Spatial distribution of notified TB(Fig 1-A) and COVID -19 (Fig 1-B) cases in Libya during the pandemic period.

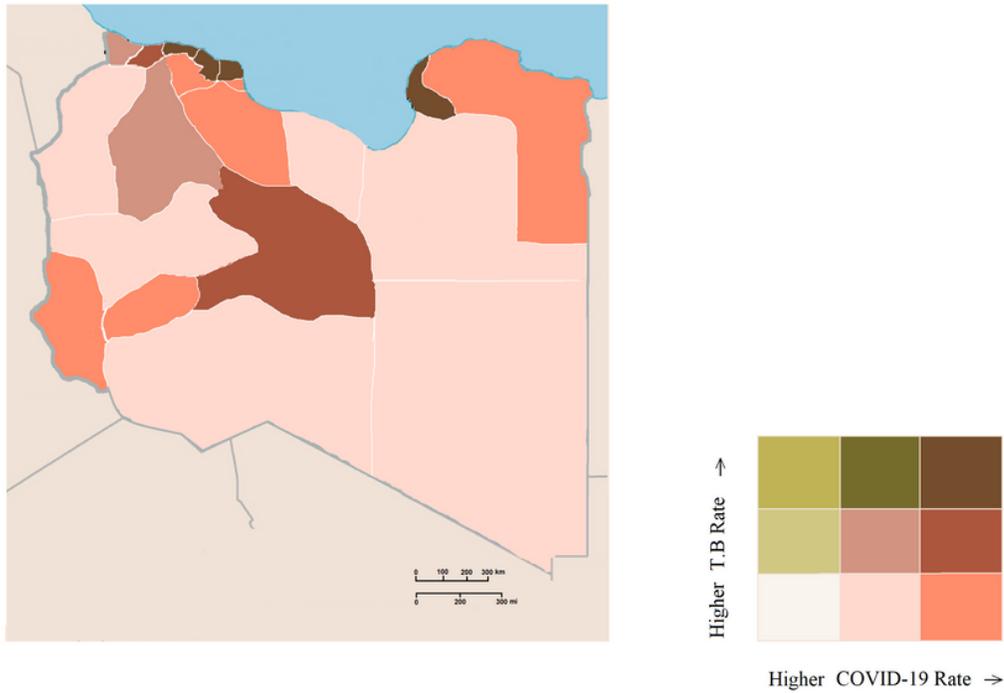


Figure 3

COVID-19 and TB rates in Libya. A color combination (high, medium, low) has been used to display the relationship between COVID-19 and TB.