



An epidemic threshold on which to base risk assessment for COVID-19 outbreaks at mass gathering events

Dear Editor

In their recent article, Yashio et al. [1], described the results of SARS-CoV-2 daily testing among athletes and personnel participating to the Olympic games in Tokyo, Japan from June 29 to September 8, 2021, with an estimated 71,000 participants from outside Japan. In addition to active testing, the games took place without spectators and vaccination of participant was encouraged, reaching more than 80% of participants. Thanks to these measures and despite a mean daily new cases of COVID-19 of 84.9 per million people in Japanese population during the Olympic game period with a peak in August [<https://covidtracker.fr/covidtracker-world/>], only 1076 participants tested positive out of 71,059 screened (1.5%). This 1.5% prevalence over a period of 72 days translates to 210.3 daily new cases of COVID-19 per million at the games which is 2.5 times more than in Japan overall.

The Hajj pilgrimage took place in Mecca, Saudi Arabia, from July 17 to 22, 2021. It was limited to 60,000 adult pilgrims under 65 years with no serious health conditions. The pilgrims were either fully vaccinated, previously recovered from COVID-19, or received one dose of vaccine 14 days before the event. Geolocalisation of pilgrims was monitored through electronic cards. In addition, Saudi Arabia used electronic robots to prevent physical contact and disperse physical gatherings. Under these conditions, no COVID-19 case was reported among participants [<https://saudiarabia.un.org/en/138039-hajj-2021-successful-and-safe-hajj-season-during-covid-19-pandemic>] despite a mean daily new cases of COVID-19 of 33.9 per million people being reported in Saudi Arabian population during the Hajj period [<https://covidtracker.fr/covidtracker-world/>].

The Grand Magal de Touba took place in Senegal from 24 to 28 September 2021, without limitation of participant number (estimated to 4–5 Million). Face mask wearing and frequent hand washing was encouraged. Our team conducted point of care PCR testing in patients suffering respiratory tract infection symptoms at one health care center during the event and none tested positive for SARS-CoV-2 [2]. It should be noted that only 0.9 daily new case of COVID-19 per million people was reported in Senegalese population during the Grand Magal de Touba after the epidemic peaked in July 2021. Moreover, no increase in daily new cases was observed following the event [<https://covidtracker.fr/covidtracker-world/>].

Interestingly, while no COVID-19 outbreak was observed at the Hajj and Grand Magal de Touba, about 1.5% of participants to the Olympics

were infected despite strict mitigation measures. This may be due to a higher level of transmission in the community in Japan as compared to that in Saudi Arabia (2.5 times less) and in Senegal (85 times less) during the events, although other factors may play a role such as density of attendees, infectivity of the circulating virus variant and preventive measures applied. This raises the question of an epidemic threshold on which to base decision of maintaining large mass gathering or not. Based on the observations at the three mass gatherings, no SARS-CoV-2 infection was observed among participants when the daily new cases per million people was <35 in the general hosting population, while cases were identified when it was about 85. We propose that a value of 60 daily new cases per million is considered as an upper limit on which to base decision for possible cancellation of large mass gatherings.

References

- [1] Yashio T, Murayama A, Kami M, Ozaki A, Tanimoto T, Rodriguez-Morales AJ. COVID-19 infection during the olympic and paralympic games Tokyo. *Trav Med Infect Dis* 2020;44:2021.
- [2] Goumballa N, Sambou M, Bassene H, Dieng M, Aidara A, Fenollar F, Parola P, Gautret P, Sokhna C. High influenza A prevalence but no SARS-CoV-2 among 2021 Grand Magal pilgrims in Touba, Senegal. *Trav Med Infect Dis* 2021;44:102189. Oct 22.

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