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## Letter to the Editor

## Face masks and containment of COVID-19: experience from South Korea



Sir,

A novel coronavirus – severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) – emerged in Wuhan, China in December 2019 and has now spread worldwide. COVID-19 spread to South Korea in late February 2020, and there was a rapid increase in the number of cases from the end of February to mid-March 2020. Fortunately, due to the efforts of the Government of South Korea and the private sector, the spread of COVID-19 has been declining rapidly, and only a few cases were reported in May 2020.

There are several reasons why COVID-19 has been relatively well controlled in South Korea. Wearing a face mask in public seems to have been one of the major contributing factors. During the COVID-19 pandemic, the use of face masks has been discouraged in several countries, particularly in Europe. However, the Government of South Korea strongly recommended that a face mask should be worn from the beginning [1,2]. Hence, we felt it would be highly informative to share the experience of South Korea from a public health perspective.

In South Korea, an aggressive ‘trace, test and treat’ programme was put in place. Members of the public were advised to avoid large gatherings and crowded places, and to follow quarantine protocols, such as wearing a face mask, hand-washing and social distancing. Among these, wearing a face mask is considered to be one of the most effective preventive measures. According to a recent article, 63.2% of Koreans reported wearing a face mask when they are outside [3]. In another international survey, the reported rate of wearing face masks among Koreans was even higher (94%); this was the highest rate among 28 countries [4].

There are several reasons why wearing a face mask has been well accepted by the public in South Korea. In 2015, there was an outbreak of Middle East respiratory syndrome coronavirus (MERS-CoV) infection, with 186 cases and 38 fatalities in South Korea. The epidemic lasted for 2 months and the Government of South Korea quarantined 16,993 individuals [5]. The MERS-CoV outbreak strengthened public acceptance of wearing a face mask in the event of the unexpected threat of respiratory viral infections.

Increased awareness of particulate matter (PM) also needs to be mentioned. South Korea has the highest PM level among

the Organisation for Economic Cooperation and Development countries [6]. Over the last few years, people in Korea have become increasingly aware of the problem after the Government of South Korea started to issue alerts. Yellow dust (also called ‘yellow sand’ or ‘Asian dust’), a natural source of PM, originates from the deserts of Mongolia and northern China, particularly in the spring. This has been a public health issue for some time, with a formal warning made in February 2014 [7]. Medical societies in South Korea have warned about health hazards, ranging from impaired infant health to increased adult mortality, and people are advised to wear a face mask when the PM level is very high [8–12]. Increasing public concern regarding PM has made the use of face masks a fact of everyday life during respiratory disease epidemics in South Korea.

The acceptance of wearing a face mask might be influenced by cultural differences. In European countries, wearing a face mask has traditionally been taken to indicate illness or bad intention. In contrast, it seems to be generally regarded as a sign of thoughtfulness and modesty in South Korea. Interestingly, young Korean pop singers made the wearing of face masks fashionable. As such, face masks are considered as fashion items by young people in many Asian countries.

Although N95 respirators have shown several advantages over medical masks in experimental conditions, several meta-analyses have concluded that there are insufficient data to support the superiority of N95 respirators over medical masks in protecting against transmissible respiratory pathogens including SARS-CoV-2 in clinical settings [13–15]. A recent article clearly showed the effectiveness of surgical face masks in reducing respiratory viral shedding [16].

To conclude, considering the relatively low incidence of severe cases or deaths and good control of COVID-19 in several countries where self-quarantine principles are well established, the use of face masks is an important strategy to stop the spread of respiratory viruses such as SARS-CoV-2. Among the methods that helped South Korea to combat this pandemic effectively, adherence to quarantine protocols such as wearing an appropriate face mask in the proper way seems to have been vital. Maintaining social distancing at all times and thorough handwashing also played a critical role in the control of COVID-19.

**Conflict of interest statement**

None declared.

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## References

- [1] Cheng KK, Lam TH, Leung CC. Wearing face masks in the community during the COVID-19 pandemic: altruism and solidarity. *Lancet* 2020. [https://doi.org/10.1016/S0140-6736\(20\)30918-1](https://doi.org/10.1016/S0140-6736(20)30918-1).
- [2] Zhou ZG, Yue DS, Mu CL, Zhang L. Mask is the possible key for self-isolation in COVID-19 pandemic. *J Med Virol* 2020. <https://doi.org/10.1002/jmv.25846>.
- [3] Lee M, You M. Psychological and behavioral responses in South Korea during the early stages of coronavirus disease 2019 (COVID-19). *Int J Environ Res Public Health* 2020;17:E2977.
- [4] Gallup. The coronavirus: a vast scared majority around the world. Seoul: Gallup; 2020. Available at: <https://www.gallup.co.kr/gallupdb/reportContent.asp?seqNo=1100> [last accessed June 2020].
- [5] Oh MD, Park WB, Park SW, Choe PG, Bang JH, Song KH, et al. Middle East respiratory syndrome: what we learned from the 2015 outbreak in the Republic of Korea. *Korean J Intern Med* 2018;33:233–46.
- [6] Organisation for Economic Cooperation and Development. Exposure to PM2.5 in countries and regions. Paris: OECD; 2020. Available at: <https://stats.oecd.org/index.aspx?queryid=72722> [last accessed June 2020].
- [7] Kang D, Kim JE. Fine, ultrafine, and yellow dust: emerging health problems in Korea. *J Korean Med Sci* 2014;29:621–2.
- [8] Byun G, Kim H, Choi Y, Lee JT. The difference in effect of ambient particles on mortality between days with and without yellow dust events: using a larger dataset in Seoul, Korea from 1998 to 2015. *Sci Total Environ* 2019;691:819–26.
- [9] Kim H, Kim J, Kim S, Kang SH, Kim HJ, Kim H, et al. Cardiovascular effects of long-term exposure to air pollution: a population-based study with 900 845 person-years of follow-up. *J Am Heart Assoc* 2017;6:e007170.
- [10] Choi S, Kim KH, Kim K, Chang J, Kim SM, Kim SR, et al. Association between post-diagnosis particulate matter exposure among 5-year cancer survivors and cardiovascular disease risk in three metropolitan areas from South Korea. *Int J Environ Res Public Health* 2020;17:2841.
- [11] Altindag DT, Baek D, Mocan N. Chinese yellow dust and Korean infant health. *Soc Sci Med* 2017;186:78–86.
- [12] Kyung SY, Jeong SH. Particulate-matter related respiratory diseases. *Tuberc Respir Dis (Seoul)* 2020;83:116–21.
- [13] Smith JD, MacDougall CC, Johnstone J, Copes RA, Schwartz B, Garber GE. Effectiveness of N95 respirators versus surgical masks in protecting health care workers from acute respiratory infection: a systematic review and meta-analysis. *CMAJ* 2016;188:567–74.
- [14] Radonovich Jr LJ, Simberkoff MS, Bessesen MT, Brown AC, Cummings DAT, Gaydos CA, et al. N95 respirators vs medical masks for preventing influenza among health care personnel: a randomized clinical trial. *JAMA* 2019;322:824–33.
- [15] Bartoszko JJ, Farooqi MAM, Alhazzani W, Loeb M. Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: a systematic review and meta-analysis of randomized trials. *Influenza Other Respir Viruses* 2020. <https://doi.org/10.1002/jmv.25846>.
- [16] Leung NHL, Chu DKW, Shiu EYC, Chan KH, McDevitt JJ, Hau BJP, et al. Respiratory virus shedding in exhaled breath and efficacy of face masks. *Nat Med* 2020;26:676–80.

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