

## Review Article

# The mask dilemma: unmasking the myths and facts

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### ABSTRACT

Coronavirus 2019 (COVID-19) has been spreading across the globe in 2020 with most countries being affected significantly in terms of the number of infected cases, morbidity and mortality, as well as health care and economic burden. Currently the most important individual and community measures for curtailing disease transmission are social distancing, hand sanitization and wearing of masks in public. It is important to advocate wearing masks in an effective and balanced manner and dispense supportive scientific evidence as well as practical guidelines and information in the community. Till the event of mass vaccination for COVID being available, improving the awareness, compliance and acceptance of the people towards proper wearing of a face mask when in public places, can be the most effective way for several countries to control transmission of COVID.

**Keywords:** COVID, Masks, Community spread, Social distancing, Pandemic

### INTRODUCTION

With the coronavirus (COVID) pandemic spreading its fangs globally since the beginning of 2020, wearing a mask has become an integral part of the attire of most people. It has been interesting to see and discern different kinds of responses to wearing masks. Large populations in most affected countries have prioritized being protected from Coronavirus infection by wearing masks. However there have also been sections voicing concerns over the adverse health impact of prolonged mask wearing, while other groups questioning the actual benefit and impact of masks in protection and limiting spread.<sup>1</sup>

Several countries have resorted to periodic lockdowns, isolating containment zones, applying travel and social restrictions, as well as limiting activities of close contact. However, all these cannot be sustainable measures, and the economical downside has been devastating for many. Scaling up testing, as well as health facilities has been done to impressive levels in many areas with further need for financial, technical and manpower support resources.

Currently at a practical individual and community level, in the absence of mass vaccination for COVID being available, the three cornerstones of protection and prevention are social distancing, hand sanitization and wearing masks.<sup>2</sup> Maintaining a distance in public of 2 meter ideally (at least >1 meter) has been accepted as the global social distancing norm, and use of routine handwashes/soaps or 70% alcohol-based sanitizers are recommended for frequent use especially before touching parts of the face.<sup>3</sup> However, with masks, there is immense variability with respect to materials, duration and conditions of use, comfort level, compliance to proper wearing and socio-cultural diversity.<sup>1</sup>

### SCIENTIFIC EVIDENCE SUPPORTING WEARING OF MASKS

Wearing masks in public places has been made mandatory by the health authorities of many countries and by World Health Organization (WHO) by June 2020.<sup>4</sup> However earlier evidence is available of the effectiveness of mask wear as seen in the study from China in February 2020, where the secondary attack rate in families decreased to

23.0% if family members wore mask, with a 79% effectiveness in reducing transmission as compared to controls (odds ratio (OR)=0.21, 95% confidence interval (CI) 0.06 to 0.79).<sup>5</sup>

Masks can have a beneficial impact in reducing the total number of cases and deaths during the pandemic.<sup>6</sup> The actual benefit in terms of containing spread of infection at individual and community level has been qualified in some recent studies. In a study from Hongkong (HK), the incidence of COVID-19 per million population with community-wide mask wearing was compared to that of non-mask-wearing countries similar in population density, healthcare system, BCG vaccination and social distancing measures. Within first 100 days (December 2019-April 2020), 129.0 per million (HK) were diagnosed with COVID in the mask wearing population, which was significantly lower ( $p < 0.001$ ) than that of non-mask wearing countries at that time like Spain (2983.2), Italy (2250.8), Germany (1241.5), France (1151.6), U.S. (1102.8), U.K. (831.5), Singapore (259.8), and South Korea (200.5). The compliance of public face mask usage in the studied community was 96.6%. Also 11 COVID-19 clusters compared to 3, were observed in workplace 'mask-off' and 'mask on' settings respectively ( $p = 0.036$ ).<sup>7</sup>

Masks mainly help to reduce the amount of infected saliva and respiratory droplets dispersed from individuals especially from those with mild or absent symptoms.<sup>7</sup> Mask use can decrease COVID transmission rate linearly, while reducing hospitalization and mortality rates non-linearly. Masks in combination with social distancing can also be useful especially in preventing asymptomatic transmission.<sup>8</sup> In a study from two districts in USA, high mask wearing (80% population wearing masks with at least 50% filtering effectiveness) could prevent 17–45% of projected deaths over two months and decrease the peak daily death rate by 34–58%.<sup>8</sup> Another study suggests that wearing a mask (with at least 50–60% filtering capacity) can potentially decrease the viral reproduction number in a general population. However, the benefit was proportional to the percentage of population wearing masks. Less than 10% mask-wearing has a minimum impact on containing the pandemic, while if 100% of the population is willing to wear a mask and high-quality masks are available, the impact of mask-wearing on containing the outbreak is most effective in all scenarios.<sup>9</sup> A study analysis from UK, showed that, regular use of facemasks (even with 50% efficiency) in public can reduce reproduction number ( $R_e$ ) to below 1, and can greatly decrease COVID spread, and also flatten secondary or tertiary waves.<sup>10</sup>

Government mandated public mask wearing in countries can greatly improve compliance, and control community spread more effectively. In a study from 15 states in USA with state government mandated mask wear in April-May 2020, post 20 days, there was a 2% decline in the daily COVID growth rate with an estimated 2 lakh cases prevented.<sup>11</sup> A study analyzing different regions of Germany, concluded that face masks reduced COVID-19

cases by 2.3-13% over the 10 days post masks being mandated as compulsory, and that face masks could reduce the daily growth rate of reported COVID infections by around 40%.<sup>12</sup> A preliminary study from Canada yet to be peer reviewed has shown that compulsory mask wearing with mandates in place, can reduce average weekly COVID cases by 25-46%.<sup>13</sup>

The benefit of wearing a mask is now scientifically evident in reducing risk of acquiring COVID at the individual level and reducing the transmission and spread of COVID at the community level. A study from Taiwan found that wearing mask with social distancing and hand sanitization also significantly decreased influenza and all-cause pneumonia cases in the peak winter season as compared to previous years.<sup>14</sup> Therefore wearing masks can also confer economic benefits and reduction in the overall burden of health care.

### ***What mask to wear?***

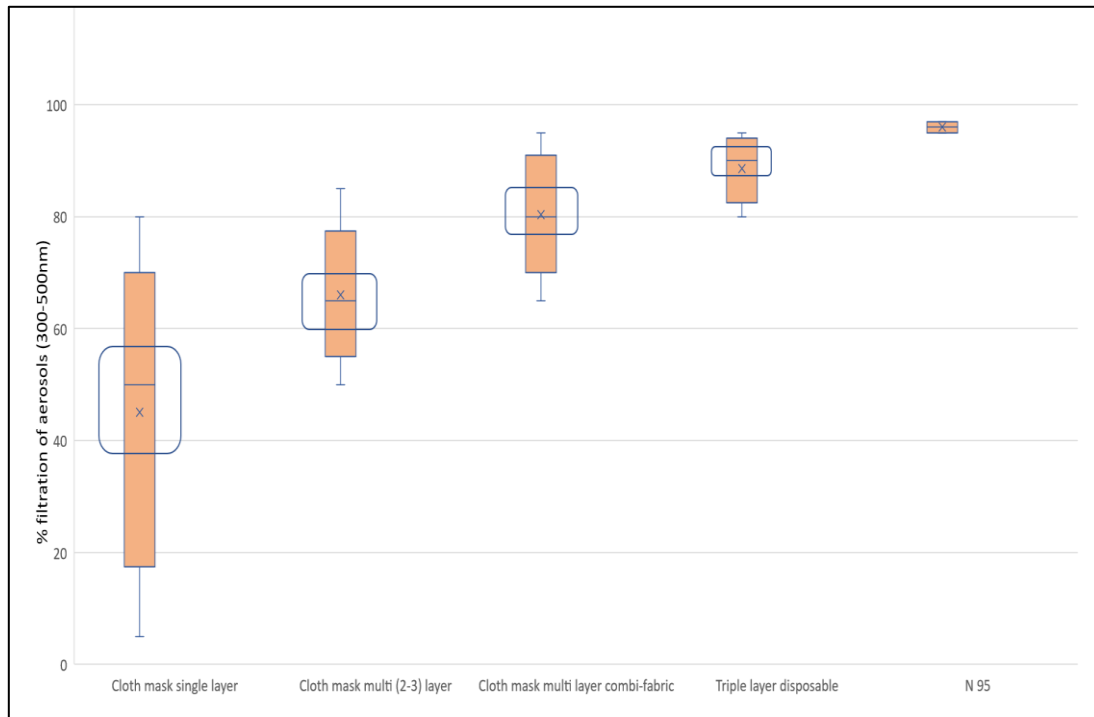
Masks available and being worn during the pandemic range from those made of cloth of various fabrics to triple layer surgical masks and the N95 masks (Figure 1). The N95 can at least filter >95% of small aerosols (300 nm or less).<sup>15</sup> N95 mask is expensive, and loses its filtration effectiveness on reuse post washing with household detergents, or alcohol.<sup>16</sup> Therefore N95 may not be suitable for wide and regular public use and should be reserved mainly for health workers or symptomatic patients.

Triple layer surgical masks which contain 2 layers of non-woven fabric with an in-between filter layer, are a good option due to a filtration efficiency ranging from 85-92% for small aerosols, and also in being affordable for bulk purchase by public.<sup>17</sup> However since these are single wear and disposable, large scale improper disposal can lead to community and environmental hazards, which is becoming an increasing matter of global concern especially in highly populated developing countries of Asia.<sup>18</sup> Therefore disposable triple layer masks for general public use should be advocated with standard procedures and guidelines for medical waste management being implemented and followed in the community. Such masks are suitable for usage in health care facilities, institutions, work-places and organized/regulated residential societies, where such waste disposal guidelines can be effectively executed and monitored.

The most practical and economical masks for all public use are cloth masks available in markets and also possible to make at home. The effective fabrics for cloth masks are tightly woven breathable ones like cotton and cotton blends preferably in 2-3 pleated layers.<sup>19</sup> Such cloth masks are more effective than single layered ones, and can both block up to 50-70% of fine droplets and up to 80% of all respiratory droplets.<sup>20</sup> Most studies showing effectiveness in reducing disease transmission with wearing of masks, have been performed with those of average 50% filtration efficiency. For cloth masks, the filtering efficiency can be

increased to 80-90% by using fabric of higher thread count or density, and by combining two different fabrics (cotton with silk/flannel/chiffon/polyester), as this can improve both mechanical and electrostatic filtration.<sup>21</sup> To be effective, masks should be worn above the nose, without

loose fitting and wide gaps between mask and face.<sup>22</sup> Masks made of knitted fabric, old masks and those washed/reused several times leading to gaps in fabric, may not have satisfactory filtration efficiency or protection.<sup>19,21</sup>



**Figure 1: Filtration efficacy of different face masks.**

### SAFE AND BALANCED APPROACH

Currently mask is a must in crowded public places where social distancing is not possible like public transport, shops, building lifts/common areas, close sitting offices, social gatherings and if visiting a healthcare facility during the pandemic.<sup>23</sup>

The flipside of wearing masks has also been recognized which includes discomfort, irritation and itching leading to repeated touching of the nose and other parts of the face, especially with longer hours of wear.<sup>24</sup> Since this sometimes cannot be helped especially when the mask slips off the nose and needs to be adjusted back, one should sanitize hands (with pocket hand sanitizers for individual carrying, or public sanitizers with operating foot pedals) before and after touching face or mask.<sup>19</sup>

Wearing of masks during routine or light physical activity and walking, does not impact either oxygen delivery or breathing effort in most people.<sup>25</sup> However heavy physical exercise like brisk walking, jogging, running, climbing, lifting weights, aerobics etc. should not be done while wearing masks. Such activities may be done at homes with adequate ventilation and virtual guidance, or with social distancing in public open/ventilated places.<sup>26</sup> If due to conditions like those causing breathing difficulties, nasal/skin allergies, physical incapacitation or

cognitive/behavioral problems, wearing a mask is not possible then keeping social distancing in public and avoiding crowded/closed/un-ventilated public spaces is recommended.<sup>19</sup> Use of a face shield instead of mask has not been considered as effective, however as it prevents direct onslaught of droplets, it may be better than no protection in cases where masks cannot be worn and social distancing is not possible.

False optimism, misplaced information, myths, and callous attitude towards the benefit of masks can have a significant adverse impact on the management of the pandemic in such countries.<sup>27</sup> At the same time drastic mandates, undeserved penalizations and lack of clarity in guidelines on the other extreme can also reduce amenability and compliance of the community.<sup>23</sup>

### CONCLUSION

In the absence of mass vaccination for COVID prevention being available, wearing of masks in public spaces especially where social distancing is not possible is the most implementable and effective strategy to contain disease spread. Scientific evidence has come in from many countries which has established that advocating and following public wearing of masks in the community can play a vital role in decreasing disease transmission, and healthcare burden. The practical and balanced middle path approach would be most suitable which includes defining

the high risk situations mandating masks, dispensing of the supportive scientific evidence of masks, guidance on types, technique and correct usage/disposal of masks, and stepping up alternate measures like social distancing, hygiene, testing and improving general health and wellbeing in the community.

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## REFERENCES

- Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. *The Lancet Respiratory Medicine*. Comment. 2020;8(5):434-36.
- World Health Organization- Coronavirus Disease (COVID-19): Masks. Updated 09 Oct 2020. Accessed on 01 November, 2020.
- Centers for Disease Control and Prevention- Coronavirus Disease (COVID-19): Hand Hygiene Recommendations. Updated 17, May 2020. Accessed on 01 November, 2020.
- World Health Organization. Advice on the use of masks in the context of COVID-19, Interim guidance, 5 June 2020. Available at: [https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications/i/item/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak). Accessed on 01 November, 2020.
- Wang Y, Tian H, Zhang L, Zhang M, Guo D, Wu W et al. Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. *BMJ Global Health*. 2020;5:e002794.
- Worby CJ, Chang HH. Face mask use in the general population and optimal resource allocation during the COVID-19 pandemic. Preprint. medRxiv.
- Cheng VC, Wong SC, Chuang VW, So SY, Chen JH, Sridhar S et al. The role of community-wide wearing of face mask for control of coronavirus disease 2019 (COVID-19) epidemic due to SARS-CoV-2. *J Infect*. 2020;81(1):107-114.
- Eikenberry SE, Mancuso M, Iboi E, Phan T, Eikenberry K, Kuang Y et al. To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID-19 pandemic. *Infectious Disease Modelling*. 2020;5:293-308.
- Li T, Liu Y, Li M, Qian X, Dai SY (2020) Mask or no mask for COVID-19: A public health and market study. *PLoS ONE*. 2020;15(8):e0237691.
- Stutt Richard O. J. H, Retkute R, Bradley M, Gilligan CA, Colvin J. A modelling framework to assess the likely effectiveness of facemasks in combination with 'lock-down' in managing the COVID-19 pandemic. *Proc R Soc A*. 2020;47620200376.
- Lyu W, Wehby GL. Community Use of Face Masks And COVID-19: Evidence From A Natural Experiment Of State Mandates In The US. *Health Affairs*. 2020;39(8):1419-25.
- Mitze T, Kosfeld R, Rode J, Wälde K. (2020) Face Masks Considerably Reduce COVID-19 Cases in Germany: A Synthetic Control Method Approach. IZA – Institute of Labor Economics, Contract No.: IZA DP No. 13319. Available at: <https://www.iza.org/publications/dp/13319/face-masks-considerably-reduce-COVID-19-cases-in-germany-a-synthetic-control-method-approach>. Accessed on 01 November, 2020.
- McMillan B. Study: mask mandates shown to significantly reduce spread of COVID-19. *SFU News* 06, Oct 2020. Available at: <http://www.sfu.ca/sfunews/stories/2020/10/study--mask-mandates-shown-to-significantly-reduce-spread-of-cov.html>. Accessed on 01 November, 2020.
- Chiu NC, Chi H, Tai YL, Peng CC, Tseng CY, Cheng CC et al. Impact of Wearing Masks, Hand Hygiene, and Social Distancing on Influenza, Enterovirus, and All-Cause Pneumonia During the Coronavirus Pandemic: Retrospective National Epidemiological Surveillance Study. *J Med Internet Res*. 2020;22(8):e21257.
- Tcharkhtchi A, Abbasnezhad N, Seydani MZ, Zirak N, Farzaneh S, Shirinbayan M. An overview of filtration efficiency through the masks: Mechanisms of the aerosols penetration. *Bioactive Materials*, Jan 2021;6(1):106-122.
- Liao L, Xiao W, Zhao M, Yu X, Wang H, Wang Q et al. Can N95 Respirators Be Reused after Disinfection? How Many Times?. *ACS Nano*. 2020;14(5):6348-6356.
- Rengasamy S, Miller A, Eimer BC, Shaffer RE. Filtration Performance of FDA-Cleared Surgical Masks. *J Int Soc Respir Prot*. 2009;26(3):54-70.
- Sangkham S. Face mask and medical waste disposal during the novel COVID-19 pandemic in Asia. *Case Studies in Chemical and Environmental Engineering*. 2020;2:100052.
- Centers for Disease Control and Prevention- Coronavirus Disease (COVID-19): Considerations for Wearing Masks. 2020. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover-guidance.html>. Accessed on 01 November, 2020.
- Centers for Disease Control and Prevention- Coronavirus Disease (COVID-19): Scientific Brief: Community Use of Cloth Masks to Control the Spread of SARS-CoV-2. 2020. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/more/masking-science-sars-cov2.html>. Accessed on 01 November, 2020.
- Konda A, Prakash A, Moss GA, Schmoldt M, Grant GD, Guha S. Aerosol Filtration Efficiency of Common Fabrics Used in Respiratory Cloth Masks. *ACS Nano* 2020;(14)5:6339-47.
- Humphreys J. The importance of wearing masks in curtailing the COVID-19 pandemic. *Journal of*

- Family Medicine and Primary Care. 2020;9(6):2606-07.
23. Royo-Bordonada MA, García-López FJ, Cortés F, Zaragoza GA. Face masks in the general healthy population. Scientific and ethical issues. *Gac Sanit*. 2020;S0213-911.
  24. Szepietowski JC, Matusiak M, Szepietowska M, Krajewski PK, Bialynicki-Birula R. Face Mask-induced Itch: A Self-questionnaire Study of 2,315 Responders During the COVID-19 Pandemic. *Acta Derm Venereol*. 2020;100:adv00152.
  25. Scheid JL, Shannon P, Lupien SP, Ford GS, West SL. Commentary: Physiological and Psychological Impact of Face Mask Usage during the COVID-19 Pandemic. *Int J Environ Res Public Health*. 2020;17:6655.
  26. World Health Organization- Coronavirus Disease (COVID-19): Coronavirus disease (COVID-19) advice for the public: Mythbusters. Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/mythbusters#:~:text=People%20should%20NOT%20wear%20masks,one%20meter%20from%20others>. Accessed on 01 November, 2020.
  27. COVID-19 in India: the dangers of false optimism. *The Lancet* editorial. 2020;396(10255):867.

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