


Leila Posenato Garcia¹ –  orcid.org/0000-0003-1146-2641

¹Instituto de Pesquisa Econômica Aplicada, Diretoria de Estudos e Políticas Sociais, Brasília, DF, Brazil

COVID-19, a disease identified for the first in Wuhan, China, in December 2019, spread rapidly and became a pandemic in just over two months. Its highly infectious etiological agent, the coronavirus known as SARS-CoV-2, together with absence of prior immunity in the human population and no vaccine in existence, means that growth in the number of cases is exponential if measures are not taken to curb its transmission.¹

Nonpharmaceutical interventions (NPI) are indicated in this context. They include measures at individual, environmental and community level, such as hand hygiene, respiratory etiquette, social distancing, keeping rooms well-aired and exposed to the sun, cleaning objects and surfaces, restricting or prohibiting access to schools, universities, community gathering places, public transport and other places where people gather together.^{2,3}

When these measures are put into place at the beginning of an epidemic, they assist with preventing transmission, reducing the speed at which the disease spreads and consequently contributing to flattening the epidemic curve.³ In this way it is possible to slow down instantaneous demand for health care and mitigate the consequences of the disease for the health of different populations, including reducing associated morbidity and mortality.⁴

There is evidence that NPIs are effective methods for reducing morbidity and mortality caused by to respiratory infections. These methods are recommended by the World Health Organization (WHO) for addressing COVID-19. Ideal use of NPIs to limit disease transmission requires application of multiple partly effective strategies which are introduced in stages, or in “layers”, over the course of the pandemic, depending on the severity of the situation and local transmission patterns. There is evidence that when NPIs are used in a combined manner they can act in a complementary or even synergetic way,

so that by overlapping they “fill the gaps” in the “layers” and gradually restrict transmission.³

China adopted rigorous measures, involving a variety of NPIs, such as social distancing, closure of establishments, lockdown and mass quarantine in Wuhan, as well as intensive case and contact tracing. WHO stated that China’s action was “the most ambitious, agile and aggressive disease containment effort in history”.⁵ Thus far evidence indicates that this combination of strategies resulted in the epidemic being suppressed in Wuhan. Another complementary strategy adopted by China to tackle COVID-19 has been the massive use of facemasks, including by asymptomatic people.⁶

In contrast, WHO recommends that facemasks should be used only by health workers and people with confirmed or suspected coronavirus infection and their carers. Use of facemasks by asymptomatic people is not recommended by WHO, due to lack of evidence as to their effectiveness in reducing transmission, together with the fact that facemasks may cause a false sense of protection and result in people not sticking to other measures known to be effective, such as hand hygiene.⁷

However, absence of evidence of effectiveness is not the same as evidence of ineffectiveness, especially in the face of a new disease with limited strategies for standing up to it.⁶ Moreover, it is known that facemasks are physical barriers and that they are effective in limiting short distance transmission through direct or indirect contact and droplet emission.^{8,9} Studies indicate that when facemasks are adequately fitted they effectively interrupt the spread of droplets expelled when coughing or sneezing, thus impeding respiratory disease transmission. Even facemasks that do not fit perfectly, such as homemade facemasks, although their performance is inferior to that of surgical and N95 facemasks, nevertheless they are capable of retaining

Correspondence:

Leila Posenato Garcia - SBS, Quadra 1, Bloco J, Ed. BNDES/Ipea, Brasília, DF, Brazil. Postcode:70.076-900
E-mail: leila.garcia@ipea.gov.br

airborne particles and viruses so that they do not reach nearby people.^{10,11} A systematic review indicated that there is some evidence to support facemask use by sick people in order to protect other people, and that public health recommendations to use facemasks for this purpose can help to reduce influenza virus transmission.¹² Another systematic review of the literature concluded that a combination of NPIs, including hand hygiene, facemask use and case isolation provided the highest level of protection against respiratory viruses.

Indeed, there are no studies about the effectiveness of asymptomatic people using facemasks to prevent COVID-19 transmission.^{13,14} On the other hand, COVID-19 transmission by infected asymptomatic individuals and those with mild symptoms has been documented, and viral load is particularly high in the initial stage of the disease.¹⁵ Authors have argued that the recommendation for asymptomatic individuals to use facemasks, as a public health intervention, could interrupt the transmission chain by blocking apparently healthy sources of infection.⁶ In other words, regardless of whether the person who is using a facemask is protected or not, its use could stop or restrict transmission by limiting the spread of infectious particles. Community transmission could be reduced if everyone, including asymptomatic and contagious people, used facemasks.¹⁶

Incipient study results add weight to this strategy. In the context of the COVID-19 epidemic in China, a scientific investigation report was published about post-exposure transmission on public transport. An infected man with a cough caught two buses. He did not use a facemask on the first one, but did use one on the second bus. In the first bus 5/39 passengers became infected, while no infection was detected in the second bus after all 14 passengers had been investigated and had follow-up for two weeks by the Chinese Center for Disease Control and Prevention – CDC.¹⁴

In an interview with *Science Magazine*, George Gao, Director-General of the Chinese CDC, stated that “The big mistake in the U.S. and Europe, is that people aren’t wearing masks. (...) Many people have asymptomatic or presymptomatic infections. If they are wearing facemasks, it can prevent droplets that carry the virus from escaping and infecting others”.¹⁷

In other countries besides China – such as Hong Kong, Japan, Thailand and South Korea –, people have used diverse types of facemasks against COVID-19. These include cloth masks which can be reused as long as they

are adequately washed. In the Czech Republic, where the government has made facemask use obligatory, the growth in new COVID-19 cases appears to be slower than in other European countries. In just ten days almost the entire Czech Republic population started using facemasks, mostly made at home with easy to find material, such as old t-shirts.¹⁸

Although their protective effect is uncertain, there is speculation that using facemasks can contribute to raising collective and individual awareness of responsibility for combating infectious diseases. Involvement of the population in the implementation of public health measures clearly helped to control the Severe Acute Respiratory Syndrome (SARS) pandemic in 2002-2003, and it would also be crucial in the COVID-19 pandemic. The meaning of powerful symbols, such as facemasks, for public health can be taken into consideration in strategies to tackle emerging infections.^{19,20}

Moreover, the fact that countries like South Korea and Germany have been capable of doing mass testing and isolating positive cases and have achieved better results in standing up to the epidemic, reinforces the importance of COVID-19 transmission via asymptomatic cases or those with mild symptoms. This allows the assumption that the recommendation for asymptomatic people to use facemasks can be useful, especially in places where testing coverage is low, as in Brazil for instance. Using facemasks can reduce coronavirus transmission in communities where there are asymptomatic individuals or people with mild symptoms who are not diagnosed and continue to interact with other people.

In this context, the Brazilian Ministry of Health is right in recommending²¹ that asymptomatic people use facemasks, as an additional strategy to other NPIs already in place. Notwithstanding, this recommendation must be accompanied by the strengthening of other recommended measures, education of the population to avoid potential stigma arising from mask use, as well as clear guidance on their correct use. It needs to be stressed that stockpiling disposable facemasks is not recommended, since surgical and N95 masks should be allocated to health workers. With regard to textile facemasks, it is important to emphasize how long they can be used for and cleaning procedures for their reuse, so as not to compromise the desired effect nor increase risk of infection.

There are, however, large gaps in the scientific literature as to the effectiveness of facemasks in reducing

community transmission of COVID-19. Although there is experimental evidence that facemasks are capable of retaining infectious droplets and potentially reduce transmission, as well as reports of transmission reduction by using facemasks, there is no evidence that such reduction occurs in community environments. Epidemiological studies are needed to elucidate this issue. They must be conducted following consistent

protocols, with sufficient sample sizes, as well as respecting research ethics principles. Furthermore, experimental studies comparing surgical facemask performance with facemasks made with different kinds of textiles are desirable in the Brazilian context. The course of the pandemic will require constant reviewing of strategies to withstand it, based on the epidemiological situation and on new evidence as it emerges.

References

1. Kucharski AJ, Russel TW, Diamond C, Liu Y, Edmunds J, Funk S, et al. Early dynamics of transmission and control of COVID-19: a mathematical modelling study. *Lancet Infect Dis* [Internet]. 2020 Mar [cited 2020 Apr 8]. Available from: [https://doi.org/10.1016/S1473-3099\(20\)30144-4](https://doi.org/10.1016/S1473-3099(20)30144-4)
2. Garcia LP, Duarte E. Intervenções não farmacológicas para o enfrentamento à epidemia da Covid-19 no Brasil. *Epidemiol Serv Saúde* [Internet]. 2020 [citado 2020 abr 7];29(2):e2020222. Disponível em: <https://doi.org/10.5123/s1679-49742020000200009>
3. Qualls N, Levitt A, Kanade N, Wright-Jegede N, Dopson S, Biggerstaff M, et al. Community Mitigation Guidelines to Prevent Pandemic Influenza - United States, 2017. *MMWR Recomm Rep* [Internet]. 2017 Apr [cited 2020 Apr 8];66(1):1-34. Available from: <https://doi.org/10.15585/mmwr.rr6601a1>
4. Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TD. How will country-based mitigation measures influence the course of the COVID-19 epidemic? *Lancet* [Internet]. 2020 Mar [cited 2020 Apr 8];395(10228):931-934. Available from: [https://doi.org/10.1016/S0140-6736\(20\)30567-5](https://doi.org/10.1016/S0140-6736(20)30567-5)
5. World Health Organization. Report of the WHO-China joint mission on coronavirus disease 2019 (COVID-19) [Internet]. Geneva: World Health Organization; 2020 [cited 2020 Apr 8]. 40 p. Available from: <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>
6. Leung CC, Lam TH, Cheng KK. Mass masking in the COVID-19 epidemic: people need guidance. *Lancet* [Internet]. 2020 Mar [cited 2020 Apr 8];395(10228):945. Available from: [https://doi.org/10.1016/S0140-6736\(20\)30520-1](https://doi.org/10.1016/S0140-6736(20)30520-1)
7. World Health Organization. Coronavirus disease (COVID-19) advice for the public: When and how to use masks [Internet]. Geneva: World Health Organization; 2020 [cited 2020 Apr 8]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks>
8. Milton DK, Fabian MP, Cowling BJ, Grantham ML, McDevitt JJ. Influenza virus aerosols in human exhaled breath: particle size, culturability, and effect of surgical. *PLoS Pathog* [Internet]. 2013 Mar [cited 2020 Apr 8];9(3):e1003205. Available from: <https://doi.org/10.1371/journal.ppat.1003205>
9. Lai ACK, Poon CKM, Cheung ACT. Effectiveness of facemasks to reduce exposure hazards for airborne infections among general populations. *J R Soc Interface* [Internet]. 2012 May [cited 2020 Apr 8];9(70):938-48. Available from: <https://doi.org/10.1098/rsif.2011.0537>
10. van der Sande M, Teunis P, Sabel R. Professional and home-made face masks reduce exposure to respiratory infections among the general population. *PLoS One* [Internet]. 2008 Jul [cited 2020 Apr 8];3(7):e2618. Available from: <https://doi.org/10.1371/journal.pone.0002618>
11. Tang JW, Liebner TJ, Craven BA, Settles GS. A schlieren optical study of the human cough with and without wearing masks for aerosol infection control. *J R Soc Interface* [Internet]. 2009 Dec [cited 2020 Apr 8];6(suppl 6):S727-36. Available from: <https://doi.org/10.1098/rsif.2009.0295.focus>
12. Cowling BJ, Zhou Y, Ip DKM, Leung GM, Aiello AE. Face masks to prevent transmission of influenza virus: a systematic review. *Epidemiol Infect* [Internet]. 2010 Jan [cited 2020 Apr 8];138(4):449-56. Available from:

- <https://doi.org/10.1017/S0950268809991658>
13. Jefferson T, Del Mar CB, Dooley L, Ferroni E, Al-Ansary LA, Bawazeer GA, et al. Physical interventions to interrupt or reduce the spread of respiratory viruses. *Cochrane Database Syst Rev* [Internet]. 2011 Jul [cited 2020 Apr 8];(7):CD006207. Available from: <https://doi.org/10.1002/14651858.CD006207>
 14. Liu X, Zhang S. COVID-19: Face masks and human-to-human transmission. *Influenza Other Respir Viruses* [Internet]. 2020 Mar [cited 2020 Apr 8]. Available from: <https://doi.org/10.1111/irv.12740>
 15. Bai Y, Yao L, Wei T, Tian F, Jin DY, Chen L, Wang M. Presumed Asymptomatic Carrier Transmission of COVID-19. *JAMA* [Internet]. 2020 Feb [cited 2020 Apr 8]. Available from: <https://doi.org/10.1001/jama.2020.2565>
 16. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. *Lancet Respir Med* [Internet]. 2020 Mar [cited 2020 Apr 8];pii: S2213-2600(20)30134-X. Available from: [https://doi.org/10.1016/S2213-2600\(20\)30134-X](https://doi.org/10.1016/S2213-2600(20)30134-X)
 17. Cohen J. Not wearing masks to protect against coronavirus is a 'big mistake,' top Chinese scientist says. *Science* [Internet]. 2020 May [cited 2020 Apr 8]. Available from: <https://www.sciencemag.org/news/2020/03/not-wearing-masks-protect-against-coronavirus-big-mistake-top-chinese-scientist-says>
 18. Prague Morning. Usage of masks "flattened" growth of coronavirus cases in Czech Republic. 2020 Mar [cited 2020 Apr 8]. Available from: <https://www.praguemorning.cz/usage-of-masks-flattened-growth-of-coronavirus-cases-in-czech-republic/>
 19. Syed Q, Sopwith W, Regan M, Bellis MA. Behind the mask. Journey through an epidemic: some observations of contrasting public health responses to SARS. *J Epidemiol Community Health* [Internet]. 2003 Nov [cited 2020 Apr 8];57(11):855-6. Available from: <https://doi.org/10.1136/jech.57.11.837>
 20. World Health Organization. Shortage of personal protective equipment endangering health workers worldwide [Internet]. Geneva: World Health Organization; 2020 [cited 2020 Apr 8]. Available from: <https://www.who.int/news-room/detail/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide>
 21. Ministério da Saúde (BR). Máscaras caseiras podem ajudar na prevenção contra o Coronavírus [Internet]. Brasília: Ministério da Saúde; 2020 [cited 2020 Apr 8]. Disponível em: <https://www.saude.gov.br/noticias/agencia-saude/46645-mascaras-caseiras-podem-ajudar-na-prevencao-contra-o-coronavirus>