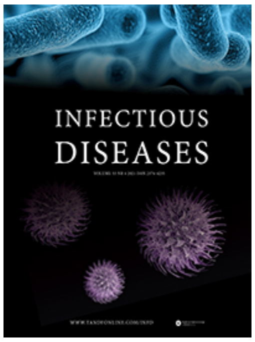


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# Effectiveness of community face mask use on COVID-19 epidemiological trends and patterns in Italy: evidence from a "translational" study

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EDITORIAL COMMENTARY

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# Effectiveness of community face mask use on COVID-19 epidemiological trends and patterns in Italy: evidence from a "translational" study

The novel, emerging coronavirus termed as the 'Severe Acute Respiratory Syndrome (SARS)-related Coronavirus Type 2' (SARS-CoV-2) is the infectious agent responsible for the generally mild but sometimes life-threatening and even fatal 'Coronavirus disease 2019' (COVID-19). Since its initial outbreak occurred in the metropolitan city of Wuhan, province of Hubei, mainland China, the virus has spread to neighbouring countries and has become first a 'public health emergency of international concern' (PHEIC) and then a global pandemic. Since late December 2019, COVID-19 has been representing a real challenging public health issue. As of 22 January 2021, the outbreak has generated a relevant toll of infections and deaths (approximately 99 million cases and more than two million people, respectively), imposing a dramatic burden both from the societal, economic-financial, and clinical points of view.

Due to the particularly contagious nature of the virus and the speed of its spreading, unprecedented public health measures, including social/physical distancing, self-isolation, quarantine, and lock-down of entire communities and countries, have been implemented and enforced. These measures have been extremely effective in controlling and containing the outbreak. For instance, some mathematical models have shown that the measures enforced by the Chinese authorities may have contributed to averting from 70.5% to 91.14% of COVID-19 cases [1,2]. Similar measures have been effective in other countries, such Italy [3] and Canada [4], among others.

According to the World Health Organisation (WHO), human-to-human spread of the virus occurs mainly through respiratory droplets (a term that refers to particles larger than 5–10 μm in diameter) and contact routes. Airborne transmission of COVID-19 would imply the presence of the pathogen within droplet nuclei, which are particles less than 5 μm in diameter, that can remain in the air for relatively long spans of time. Furthermore, the infectious agent can be transmitted from an individual to another over physical distances greater than 1 m. Airborne transmission of SARS-CoV-2 and the precise mechanisms underlying the route(s) of its transmission are still debated. However, according to a recently published rapid review of the literature, there seems to exist sufficient evidence of the airborne transmission of coronaviruses in previous Asian outbreaks, such as those occurred in mainland China, South Korea, and the Kingdom of Saudi Arabia (KSA) and caused by the 'SARS-related Coronavirus Type 1' (SARS-CoV-1) and the 'Middle Eastern Respiratory Syndrome (MERS)-related Coronavirus' (MERS-CoV) [5]. Moreover, according to the WHO, airborne transmission of COVID-19 may be possible in some settings and under specific circumstances. With respect to this route of transmission, community use of face masks can represent a crucial tool in the efforts of counteracting and mitigating against the burden imposed by COVID-19.

In terms of evidence-based medicine, Tabatabaeizadeh [6] has conducted a systematic review of the literature with meta-analysis and has synthesised 4 studies totalling 7688 participants. A statistically significant reduction in infection rate using face masks was reported with an overall relative risk (RR) of 0.12 [95% confidence interval or CI ranging from 0.06 to 0.27]. Another systematic review and meta-analysis carried out by Li et al. [7] found similar results, with a pooled odds-ratio (OR) of 0.38 [95%CI from 0.21 to 0.69], pooling together 6 studies from 4 countries. Decrease in COVID-19 infections was even more marked for the healthcare workers group, with COVID-19 cases being reduced by approximately 70%. Similarly, a systematic review and meta-analysis conducted by Liang and co-authors [8], synthesising 21 studies, found that community use of face masks conferred a statistically significant protective effect with a pooled OR of 0.35 [95%CI from 0.24 to 0.51]. Stratifying according to specific (sub-)populations, use of face masks was found to be effective both in healthcare workers and nonhealthcare workers, significantly reducing the risk of developing respiratory virus infection by 80% (with an OR of 0.20 [95%CI from 0.11 to 0.37]) and by 47% (with an OR of 0.53 [95% CI from 0.36 to 0.79]), respectively. Hover, intriguingly, differences were found in terms of geographical locations of the studies impacting the protective effect of wearing face masks. The protective effect appeared to be higher in Asian countries compared to Western countries (OR 0.31 versus OR 0.45, respectively), probably reflecting differences in compliance and adherence to the public health measure. Moreover, community use of face masks conferred a statistically significant protective effect against respiratory pathogens, such as influenza viruses (with an OR of 0.55), SARS-CoV-1 (with an OR of 0.26), and SARS-CoV-2 (with an OR of 0.04). Furthermore, when authors carried out subgroup analyses, the different study design of the investigations was found to have an impact on the computed effect size, with protective effects of wearing face mask being statistically significant in studies devised as cluster randomised trials (CRTs) or observational investigations.

However, according to another systematic review of the literature with meta-analysis conducted by Aggarwal and colleagues [9], combining together 9 and 8 studies and carrying out a qualitative and quantitative synthesis, respectively, community use of face masks was not associated with a statistically significant decrease in self-reported influenza-like illness (ILI) or flu-like syndrome symptoms. Authors computed, indeed, an overall effect size of −0.17 [95%CI from −0.43 to 0.10] regarding the reduction in ILI rate. Interestingly, community face mask use was not found to be effective also when combined with hygiene practices, such as hand-washing (with a pooled effect size of −0.09 [95%CI from −0.58 to 0.40]).

While evidence is accumulating concerning the effectiveness of community use of face masks and their impact on COVID-19 epidemiological trends and patterns, Pedersen and Meneghin [10] have made an interesting contribution from a 'translational' perspective, using real-world data and directly investigating the impact of health policies, choosing Italy as a case study. More specifically, authors have devised a 'Susceptible – Infectious – Quarantined – Recovered' (SIQR) epidemic compartmental model, which, by exploiting data-driven information, is able to show the efficacy of public health measures and interventions in slowing/curbing the diffusion of the COVID-19 pandemic. The model enables to identify change points in COVID-19 spreading and transmission dynamics, correlating such change points with the implementation of specific public health measures and interventions, including regulations strongly recommending or orders enforcing the community use of face masks. Therefore, it is possible to investigate the effectiveness of a given health policy in terms of changes in behaviours of the epidemic curve. In such a way, public health policy- and decision-makers are equipped with a tool that can predict in real time (forecasting/now-casting) the impact of relaxing some COVID-19 related strictures, lifting the lock-down and (gradually) re-opening a community/territory. The particular strength of the approach implemented by Pedersen and Meneghin [10] consists in the identification of the epidemic change points by utilising rather simple techniques of infectious disease mathematical modelling, that can serve as a starting point for data fitting and subsequent refinement/increase in sophistication. Given the high uncertainty about several epidemiological parameters of the COVID-19 transmission dynamics, especially during the early phases of the pandemic, a data-driven approach is preferrable with respect to one based on theoretical frameworks and a priori assumptions of various model parameters, which could lead to biased predictions. With such a model, Pedersen and Meneghin [10] have been able to demonstrate the efficacy of the community use of face masks.

In conclusion, Pedersen and Meneghin [10] have added another significant pebble to the mosaic of the still ongoing COVID-19 pandemic, exploiting data from a specific country, Italy, which has been hardly hit by the COVID-19 pandemic, but using an approach that can be generalised to other countries as well as to other public health measures, interventions and policies. In particular, it would be extremely interesting to replicate and confirm the findings obtained by Liang and co-authors [8], concerning geographical disparities of the efficacy of the community use of face masks (in Asian versus Western countries). Several are the public health implications arising from the work of Pedersen and Meneghin [10], such as the feasibility of utilising a validated and reliable tool for tracking and monitoring the effectiveness of a given health policy, making decision in an informed- and evidence-based fashion on whether escalating/de-escalating a measure or implementing a more stringent package of public health interventions. Finally, since it can be anticipated that, due to factors such as globalisation, gentrification and environmental variables, like air pollution, future outbreaks are highly likely to occur, knowledge arising from the ongoing COVID-19 outbreak and from the current mathematical modelling experience, including the model devised by Pedersen and Meneghin [10], can be promptly used in case of future pandemics.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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