



# UNCOVER

Usher Network for COVID-19  
Evidence Reviews

Summary: What is the effectiveness of face masks in preventing respiratory transmission in the community?

Date: 27 May 2020

Version: UNCOVER-010-02



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## **Title:** What is the effectiveness of face masks in preventing respiratory transmission in the community?

### **Summary answer:**

The original review was conducted on 20 April 2020. It was updated on 27 May 2020 to incorporate evidence from fluid mechanics studies.

#### **Evidence:**

- Based on the evidence from **four** recent systematic reviews and meta-analyses wearing face masks in the community is not significantly associated with a reduction in Influenza-like-illness (ILI) and the overall assessment of the quality was classified as low.
- Of the **four** high quality recent reviews we scrutinised in detail, **three** included only RCTs [Jefferson 2020, Xiao 2020, Long 2020], whereas the fourth [Brainard 2020] included population studies too. We ran updated literature searches for these reviews to identify new studies. No new studies meeting inclusion criteria were identified.
- Jefferson 2020 and Long 2020 included 9 RCTs (7 in the general population and 2 in health care workers) and reported that there was no reduction of Influenza-like illness (ILI) for masks compared to no masks [Random effects OR (95% CI): 0.93 (0.83, 1.05)].
- We re-ran a random effects meta-analysis restricting to the 7 RCTs conducted in the general population from Jefferson 2020 and also found no significant reduction of ILI [OR (95% CI): 0.92 (0.87, 1.07)]. Risk of bias analysis using the Cochrane tool done by Jefferson et al indicated that there was high or unknown risk of bias in relation to performance, detection and reporting bias.
- Xiao 2020 evaluated environmental and personal protective measures for pandemic influenza in non-healthcare settings. They ran a fixed effect meta-analysis of 10 RCTs of community use of face masks (with or without hand hygiene measures) and they reported a no significant reduction of ILI [Fixed effect OR (95% CI): 0.92 (0.75, 1.12)]. We repeated the analysis using random effects meta-analysis and the result was similar [Random effects OR (95%CI): 0.97 (0.79, 1.18)]. The study quality of the included studies was evaluated using GRADE by Xiao et al and the overall assessment of the quality was classified as low.
- Brainard 2020 included all study designs on facemasks and similar barriers to prevent respiratory illness. Based on random effects meta-analyses on RCTs, they concluded that wearing face masks can be very slightly protective against primary infection from casual community contact, but this was not significant, and the evidence was classified as low certainty-evidence using the Cochrane risk assessment [Random effects OR (95% CI): 0.94 (0.75, 1.19)]. Similar were the findings for the prevention of household infections when both infected and uninfected members wear face masks.
- Although epidemiological studies do not support the hypothesis that masks are effective at reducing the transmission of respiratory infections, there is robust evidence from laboratory studies which measure the extent to which droplets and aerosol are dispersed. Droplets ejected by unfiltered sneezes can reach 7 – 8 metres (Bourouiba, 2020), coughs can reach 4 – 6 metres (Bourouiba et al, 2014) and aerosols more than 1 metre (Bourouiba et al, 2014; Tang et al, 2009; Viola et al, 2020). The ranges depend on temperature, humidity and environmental airflows. Furthermore, there is evidence from this type of study that wearing a mask can reduce these distances to a few centimetres (Tang et al 2009; Viola et al, 2020). Hence, from a mechanical point of view, there is evidence that masks CAN mitigate virus transmission. Of course, these fluid mechanics studies do not account for potential

behavioural factors associated with mask use (e.g. perhaps touching your face more, washing your hands less, engaging more readily in high risk exposures, reusing a contaminated mask etc). As these may play a role in actual transmission rates there is an ongoing need for robust epidemiological studies to assess the real world impact of mask use on SARS-CoV-2 transmission rates.

## Extended abstract:

For a description of the underlying literature search, please see link for the full review. We identified 4 published systematic reviews with meta-analyses on the effectiveness of face masks in preventing respiratory transmission in the community (Jefferson 2020, Brainard 2020, Xiao 2020, Long 2020). We run two literature searches to identify additional original studies to update the identified systematic reviews (the first on 06/04/2020 and the second on 16/04/2020). We excluded publications from nosocomial settings, modelling data, animal models, providing commentary but no data, and, due to time constraints studies published before 2020. In the first database searching 766 results were found, reduced to 81 after removal of duplicates and pre-2020 publications. We excluded 72 records by screening titles and abstracts and a further 9 at the full text screen/quality assessment phase, leaving 0 new articles for inclusion in the final review. In the second database searching 329 new results were found. We excluded 301 records by screening titles and abstracts and a further 28 at the full text screen/quality assessment phase, leaving 0 new primary studies for inclusion in the final review.

First screening was shared between three reviewers (MG, XL, WX) and second screening between 2 reviewers (EM, LG). Each new title, abstract and full text was screened by one reviewer. References of previous systematic reviews were searched by two reviewers.

This review was updated on 27 May 2020 to incorporate additional evidence on fluid mechanics. Two new citations were added (Tang et al, 2009; Viola et al, 2020).

**Link to full review and any relevant updates:** <https://edin.ac/facemasks>

**Date completed:** 20/04/2020

## Contact details of lead reviewers:

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**Review updated by:** Ruth McQuillan, Ignazio Maria Viola

## Key references:

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3. Xiao J, Shiu EYC, Gao H, et al. Nonpharmaceutical Measures for Pandemic Influenza in Nonhealthcare Settings-Personal Protective and Environmental Measures [published online ahead of print, 2020 May 17]. Emerg Infect Dis. 2020;26(5):10.3201/eid2605.190994. doi:10.3201/eid2605.190994
4. Long Y, Hu T, Liu L, et al. Effectiveness of N95 respirators versus surgical masks against influenza: A systematic review and meta-analysis. J Evid Based Med. 2020; 1-9.

## References added in update 27 May 2020

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