



# UNCOVER

Usher Network for COVID-19  
Evidence Reviews

Review: What is the evidence for the importance of outdoor transmission and of indoor transmission of COVID-19?

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**Title:** What is the evidence for the importance of outdoor transmission and of indoor transmission of COVID-19?

**Date of review:** 2 April 2020.

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## **Question: What is the evidence for the importance of outdoor transmission and of indoor transmission of COVID-19?**

### **Answer:**

- Despite librarian-supported duplicate searches by experienced reviewers, no high quality studies directly addressing the study question were identified. This review will continue weekly literature updates to identify any new relevant evidence as it is reported.
- We found no studies reporting data on transmission in outdoor settings and no studies comparing transmission in outdoor settings with transmission in indoor settings.
- Evidence on transmission is limited and of poor quality: it consists mostly of case reports (n = 14). These are mainly from China/East Asia (n = 12) with one from USA and one from Europe.
- The vast majority of case reports show transmission via family clusters/people living and eating together; however there is also evidence of wider community transmission in a range of settings: shopping centres, aeroplanes, restaurants, conferences, churches/temples, tour groups, air travel.
- Transmission patterns are consistent with fomites (door handles, lift buttons, taps), droplet spread or aerosolisation in confined spaces.
- Key issues and concerns raised in the literature focus on uncertainty about fomites and how long these present an infection risk.
- We found two studies which reported an inverse correlation between environmental temperature and the rate of new cases. The authors interpret this as cooler temperatures driving people indoors, where conditions are more favourable to virus transmission.
- We found a recent paper which suggests that coughs and sneezes may travel much further in the air than previously thought (up to 6 – 8 metres). (Bourouiba et al, 2020)
- Conclusion: Whilst there is evidence of community transmission across a range of (mainly indoor settings), precise transmission mechanisms remain unclear. There is an absence of evidence on transmission in outdoor settings; however given emerging evidence on the possibility of coughs and sneezes travelling much further than previously thought, caution about the risk of outdoor transmission is warranted.

### **Background:**

There is a perception that there is good evidence for indoor transmission but less clarity about outdoor transmission. Can outdoor restrictions safely be relaxed? This rapid review was carried out to establish whether there is evidence for outdoor transmission of COVID-19, in the absence of close contact.

### **Methods:**

We adapted rapid review methods outlined by the Cochrane Collaboration. We sought publications with data on outdoor transmission of COVID-19 of any study design and of published or pre-

published status. We excluded publications from nosocomial settings, modelling data, animal models, providing commentary but no data and not about COVID-19. We searched PubMed and medRxiv. The searches were carried out by one reviewer (MD). The PubMed search was adapted from search blocks shared by the health information specialist community, and peer reviewed. The PubMed search was limited to publications from Dec 2019 onward, to focus on COVID-19. There were no language limitations as part of the search, but due to time and resource constraints, non-English publications were not included in analysis.

Screening was shared between four reviewers. Each title and abstract was screened by one reviewer (AH, EM) and rejected records were screened by a second reviewer (RM, MD). Where the second reviewer disagreed with the first reviewer, the record was included for full text screening. Full text screening was shared between three reviewers (AH, EM, RM), with each publication screened by one reviewer. Data extraction was completed at the same time as full text screening, using a data extraction template that had been piloted by four reviewers in advance. Rejections at full text screening and extracted data were not checked by a second reviewer, but findings were discussed at regular intervals to ensure consistent approaches. A quality assessment template was piloted by four reviewers, then quality assessment was carried out by four reviewers, always ensuring that each reviewer did not quality assess the publications for which they had done data extraction, with the aim of enabling sense checking. We used the following quality assessment checklists: CASP checklist for systematic reviews and Joanna Briggs checklists for case series and cross-sectional studies.

## Results:

A total of 613 results was found from the database searching. We excluded 317 records by screening titles and abstracts and a further 266 at the full text screen/quality assessment phase, leaving 18 articles for inclusion in the final review. The key findings from this rapid review were:

- We found **no studies** reporting data on transmission in outdoor settings
- We found no studies comparing transmission in outdoor settings with transmission in indoor settings.
- Evidence on transmission is limited and of poor quality: it consists mostly of case reports (n = 14). These are mainly from China/East Asia (n = 12) with one from USA and one from Europe.
- The vast majority of case reports show transmission via family clusters/people living and eating together; however there is also evidence of wider community transmission in a range of settings: shopping centres, aeroplanes, restaurants, conferences, churches/temples, tour groups, air travel.
- Transmission patterns are consistent with fomites (door handles, lift buttons, taps), droplet spread or aerosolisation in confined spaces.
- Key issues and concerns raised in the literature focus on uncertainty about fomites and how long these present an infection risk.
- We found two studies which reported an inverse correlation between environmental temperature and the rate of new cases. The authors interpret this as cooler temperatures driving people indoors, where conditions are more favourable to virus transmission.
- We found a recent paper which suggests that coughs and sneezes may travel much further in the air than previously thought (up to 6 – 8 metres). ([Bourouiba et al, 2020](#))

## Conclusions:

This review found no studies focused explicitly on the outdoor transmission of COVID-19 and no high quality research on indoor transmission in the community. The review was conducted very quickly, and as such has the following weaknesses: full text screening, extracted data and quality assessment

were not checked by a second reviewer, thus introducing a risk of bias; because of time pressure, we refocused the review half way through to focus explicitly on outdoor transmission, so data on indoor transmission may be less complete. We will continue to update and refine this review going forward.

In conclusion, whilst there is evidence of community transmission across a range of (mainly indoor settings), precise transmission mechanisms remain unclear. There is an absence of evidence on transmission in outdoor settings; however given emerging evidence on the possibility of coughs and sneezes travelling much further than previously thought (Bourouiba, 2020), caution about the risk of outdoor transmission is warranted.

The UNCOVER network is committed to responding quickly and impartially to requests from policymakers for evidence reviews. This document has therefore been produced in a short timescale and has not been externally peer-reviewed.

## Keywords:

COVID-19; coronavirus; SARS-CoV-2; transmission; environment; outdoor; indoor

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