Face coverings in the community and COVID-19: a rapid review

Review questions

Q1. What is the effectiveness of face coverings to reduce the spread of COVID-19 in the community?

Q2. What is the efficacy of different types of face coverings designed for use in community settings?

Key messages

- 28 studies were identified, but none of them provided high level evidence and 15 were non-peer-reviewed preprints (search up to **5 June 2020**). The evidence was mainly theoretical (based on modelling or laboratory studies) and epidemiological (highly subject to confounders).
- There is weak evidence from epidemiological and modelling studies that mask wearing in the community may contribute to reducing the spread of COVID-19 and that early intervention may result in a lower peak infection rate.
- Evidence from modelling studies suggests that beneficial effects of wearing masks may be increased when combined with other non-pharmaceutical interventions, such as hand washing and social distancing.
- Limited and weak evidence from laboratory studies suggests that materials such as cotton and polyester might block droplets with a filtering efficiency similar to medical masks when folded in 2 or 3 layers.

Background

Face masks can play a role in controlling infection in clinical settings when used as part of a comprehensive package of infection control measures. However, the evidence is less clear regarding the use of face masks (or coverings) outside of clinical settings. Recent meta-analyses have reached opposite conclusions; however, this can partially be explained by differences in inclusion criteria.(1-3) Two meta-analyses, including only randomised controlled trials (RCTs), reported that face masks are not effective in reducing transmission of influenza in the community, based on 7 randomised controlled trials (RCTs) in a Cochrane review (2) and 10 RCTs in the other review.(3) Both reviews synthesised a similar body of evidence for non-healthcare settings, all in non-pandemic settings. In contrast, a meta-analysis published in Lancet (1) included studies of any design focused on SARS, MERS or COVID-19 (that is, in pandemic settings) and suggested that the use of face masks in community settings may protect from infection. This review included only 3 observational studies for non-healthcare settings, all conducted in Asia during the SARS outbreak. In short; evidence from RCTs in non-pandemic settings suggests that the use of face masks within the community is not effective in reducing transmission of influenza-like illness, while evidence from observational studies during the SARS outbreak show an association between the use of masks in the community and reduced risk of infection. While observational studies typically provide lower-level evidence than RCTs, most of the

RCTs identified were small underpowered studies that often combined use of face masks with other interventions such as hand washing, therefore providing limited evidence on use of face masks in the community.

Two non-peer-reviewed preprint systematic reviews (4, 5) have assessed the whole body of evidence (RCTs and observational, pandemic and non-pandemic settings), focusing on community settings, and have interpreted the inconsistencies highlighted above slightly differently. One review concluded that the use of face masks in the general population might offer benefits in preventing the spread of viruses, but that it was limited by population adherence and that initiating mask use right at the beginning of infection outbreaks was more effective.(4) The other study concluded that evidence was not strong enough to support widespread use of face masks but that there was enough evidence to support their use for short periods of time by particularly vulnerable individuals when in transient higher risk situations.(5) It was also suggested that the protective effect was increased when face masks were worn by both the susceptible person and the infected person (5) and that the use of face masks in the community might be more effective in epidemics with transmission from asymptomatic individuals, as has been observed in SARS-CoV-2.(4)

In view of this conflicting evidence, national and international organisations have recently conducted analyses and evidence reviews supported by expert panel discussion to inform policy on whether widespread use of face masks in the community should be recommended to reduce the spread of COVID-19:

- the World Health Organization (WHO) reported, in its interim guidance of the 5 June 2020, that to prevent COVID-19 transmission effectively in areas of community transmission, governments should encourage the general public to wear masks only in specific situations and settings and as part of a comprehensive approach to suppress COVID-19 transmission (6)
- the Norwegian Institute of Public Health (NIPH) reported that there was evidence of protective effect of medical face masks against respiratory infections in community settings but that the results varied greatly; they concluded that in the epidemiological situation in Norway as in May 2020 (infection rate of 5 cases per 100,000 per week) the use of face masks in the community was not recommended but that, if the situation worsened, their use as a precautionary measure should be considered (7)
- the Alberta Health Services COVID-19 Scientific Advisory Group concluded that there was “some modelling, ecological and anecdotal data suggesting benefit to medical mask use in the community”; they also reported that there was limited evidence of harms related to community mask wearing but noted concern of unintended negative consequences (for example, lower adherence to other protective measures such as hand hygiene and social distancing) (8)
- in an analysis conducted by the New and Emerging Respiratory Virus Threats Advisory Group (NERVTAG) for the Scientific Advisory Group for Emergencies (SAGE), it was reported that there was “indirect data and weak direct evidence that use of face masks by symptomatic individuals may reduce transmission from them” and that “appropriate use of face masks is an important component of their effectiveness”(9)

The evidence is even more limited in relation to homemade masks and to the filtration properties of different fabrics.(7, 8) In its guidance of the 5 June 2020, the WHO

acknowledge that few cloth masks have been systematically evaluated and that, due to their expected lower performances compared to medical masks, they should only be considered as source control and for specific activities (e.g. public transport) and that their use should always be accompanied by frequent hand hygiene and physical distancing.(6) The NERVTAG report for SAGE concluded that "cloth masks have a lower protective effect than surgical face masks or respirators and may have a lower source control effect".(9) In a recent systematic review (preprint), Mondal et al concluded that "although cloth masks generally perform poorer than the medical grade masks, they may be better than no masks at all".(10)

The current recommendations for England are that it is mandatory to wear face coverings, at all times, on public transport. It is also recommended, but not mandatory, to wear a face covering in other enclosed public spaces where social distancing isn't possible.(11) Guidance is also provided on how to make and wear a cloth face covering.(12)

Objective

The purpose of this rapid review was to identify and assess direct evidence from the COVID-19 outbreak on the use of face coverings in the community, and the efficacy of different types of homemade face coverings for use in community settings (i.e. not medical masks). It was agreed that the search dates would be from 25 March 2020, which was the cut-off date in the systematic review by Chu et al.(1)

To note that:

- 'face coverings' include medical masks and cloth masks; while our review questions refer to 'face coverings', the studies identified mainly used 'face masks'. For accuracy, 'face masks' will therefore be used in the following to refer to any type of face covering, unless specified otherwise
- 'community' refers to non-healthcare settings, including public spaces, households, shops, etc.

Summary of methods

A literature search was undertaken to look for primary evidence related to the COVID-19 outbreak, published (or available as preprint) between 25 March and 5 June 2020.

See Annex 1 for details of the methodology. A protocol is available on request.

Evidence

The search returned 1,063 records and 1 additional paper was identified by searching reference lists of relevant systematic reviews. After removal of duplicates, 626 records were screened by title and abstract. Of these, 57 full-text articles were assessed for eligibility and 28 were included in this review. A PRISMA diagram is provided in Annex 1. The list of excluded studies can be found in Annex 2.

Of these 28 papers, 7 were observational (mainly epidemiological), 13 were modelling studies and 8 were laboratory studies. Fifteen of the 28 articles were preprint (not peer-reviewed). Full details of the studies can be found in the supplementary material.

The evidence is summarised below for each review question. The observational and modelling studies mainly provide evidence for the first review question while the second question has been assessed mainly though laboratory studies.

Q1. What is the effectiveness of face coverings to reduce the spread of COVID-19 in the community?

Evidence from observational studies (Table S1, Supplementary material)

Seven observational studies provided evidence on the effectiveness of face coverings to reduce the spread of COVID-19 in the community.(13-19) Of these, 3 were preprints.(15-17)

One study was a retrospective cohort study (13) and the others were all epidemiological.

The retrospective cohort assessed the effect of face masks, social distancing and disinfection on secondary attack rates in 124 household in Beijing.(13) In a multivariable logistic regression model, face mask use by the primary case and family contacts before the primary case developed symptoms remained significantly associated with a reduced risk of transmission (79% effective). While this study provides some evidence of effectiveness of mask use, it is unclear how this result would be transferable to the UK context which does not have previous experience of epidemics such as SARS and MERS and therefore no previous experience of public face mask wearing.

The epidemiological studies were conducted at community level in Asia (14, 18) or at country level (up to 198 countries included).(15-17, 19). These studies provide low-level evidence and are at risk of bias, especially for confounding. Not all of them were adjusted for potential confounding factors and when they were, not enough information was provided to be able to rule out residual confounding such as other non-pharmaceutical interventions, stage of the epidemic or testing. They also present a risk of bias in measurement of the exposure as most of them assessed mask usage based on national policies rather than compliance data, and no information was provided on the type of masks used. In addition, 3 of the 4 country-level epidemiological studies were non-peer-reviewed preprints.(15-17)

Among the country-level epidemiological studies, one study (preprint) specifically looked at European countries, analysing the different approaches and timing of the restrictions implemented to control the COVID-19 epidemic.(17) The authors concluded that the use of face coverings in public was not associated with any independent additional impact of other measures, but noted that the data on face coverings were too preliminary to be reliable.(17) The other three country-level studies suggest that the use of masks in the community might be effective in reducing the spread of COVID-19,(15, 16, 19) and that they might be more effective when used from the beginning of the epidemic (preprint).(15, 16) These results were obtained, broadly speaking, by comparing the effect of wearing a mask, using data from Asian countries, versus not wearing a mask, based on European data among others, and might therefore not be directly applicable to European countries. However, an epidemiological study conducted in Germany at the region-level also suggests that face masks might be associated with a 40% reduction in the number of COVID-19 infection.(20) The methodology was similar to other reported studies (comparing

registered COVID-19 cases to when face masks became compulsory) and is subject to the same limitations. This study, not peer-reviewed, was not included as it was published after the search date for this review.

Overall, these studies suggest that face masks use at community level might be effective in reducing the spread of COVID-19. However, these results are susceptible to residual confounding and might over-estimate the protective effect of face masks, and 3 of the 7 studies have not been peer-reviewed. It should also be noted that the evidence showing a protective effect of face masks comes from studies conducted in Asian countries and that the transferability and applicability of these results to European countries is unclear, for example due to cultural differences.

Evidence from modelling studies (Table S2, Supplementary material)

Thirteen modelling studies assessed the effectiveness of wearing masks by the public, and in the community, in reducing the rate of transmission (R_0) of COVID-19.(21-33) Nine studies were in preprint.(21-23, 25, 27, 30-33)

Ten studies reported the independent effectiveness of using masks in the community to reduce the rate of infection of COVID-19.(21-26, 29, 31-33) Seven reported effectiveness of wearing masks when other public health strategies or policies were also in place.(21, 25-28, 30, 33)

When wearing masks in the community was the only measure to prevent the spread of infection, the effect was positive in all studies, although the strength was variable. In all cases, the strength of the effect was related to the effectiveness of the mask and to the proportion of the population wearing a mask, where higher proportions of both resulted in a greater effect. For instance, one peer-reviewed study modelled the effect of lifting the lockdown in London on death rates and on R_0, with and without additional measures: without any interventions, the model predicted a 14.5 fold increase in deaths and an R_0 of 2.56; however, when 30% of the infected population wore 'face masks' (30% effectiveness) and 30% of the general population wore 'face coverings' (10% effectiveness), the increase of deaths would reduce to 12.34-fold and R_0 to 2.23.(28) This continued to reduce as coverage within each population increased. A similar study predicted that an immediate 80% uptake of mask usage in the population, with masks that are 50% effective, could prevent 17-45% of deaths, and reduce peak daily deaths by 34-58%, over two months in New York State, accounting for variable values of R_0.(29)

Seven studies assessed the effectiveness of different types of masks by defining different levels of probable risk reduction.(22-24, 28, 29, 31, 32) As expected, wearing masks with higher filtration efficiency resulted in a lower rate of transmission of infection in the population. The most frequently cited effectiveness of mask that may prove to be beneficial when worn in a population was 50%, comparable to that of a surgical mask.(22, 23, 26, 29, 31) However, all masks offered some form of risk reduction, and this was true at high and low levels of population adherence. One study (preprint) further observed that having a smaller proportion of the population wearing high-quality masks may yield a similar reduction in the rate of transmission as having a larger proportion of the population wearing moderate-to-low quality masks.(23) However, these studies also offered no consistency in

quantifying the effectiveness of 'face mask' and 'face covering', nor do they offer definitions of what one would consider a 'face mask' to be, compared to a 'face covering'.

When combined with other public health strategies, such as shielding vulnerable populations, hand washing, or social distancing recommendations, the effect of wearing a mask to reduce the spread of COVID-19 increased. Further, this increase was always multiplicative, not additive. One study (preprint) that used existing epidemiological data on the spread of COVID-19 in France included 194 model parameters (disease characteristics and social behaviours) to simulate the outbreak and assessed the impact of different non-pharmaceutical interventions: compared to no intervention, mask-wearing and social distancing each resulted in 19% and 20% reductions in cumulative mortality respectively, this increased to 60% when both were in effect.(25) Another study observed that a 70% or greater adherence to mask-wearing could theoretically eliminate the disease in New York State.(26) The study went on to observe that when wearing a mask of 50% effectiveness, and with strict social distancing measures, an adherence of 30% in the population could see similar results.

Part of the limitations of modelling studies is that they must make assumptions in cases where the evidence or data are lacking. For example, models used different parameters to define 'effectiveness' of masks, which ranged from an 8% (24) reduction in risk to >95% (29) reduction in risk. The nature of modelling studies also means that simulations are run in controlled environments that may not accurately reflect the behaviours that we observe in real life. Unless controlled for, parameters can be fixed that are usually variable. For example, unless explicitly included in the model, such as in the study by Eikenberry,(29) the basic reproduction number may not change in a simulated outbreak. In cases where R_0 does change, other parameters may not. As these modelling studies were conducted using different models and are calibrated using different datasets, the estimations and assumptions that are made on the probability of model parameters are not equal across studies, making comparison between them difficult.

Q2. What is the efficacy of different types of face coverings designed for use in community settings?

Evidence from laboratories studies (Table S3, Supplementary material)

Eight laboratory studies were identified,(34-41) of which 3 were preprints.(36-38) Three studies assessed the filtration efficiency of different materials using particle respirator filter testers (pressure difference measurement) with NaCl aerosol generators.(34-36) The other studies, mainly based on optical measurements, used less conventional approaches to simulate the droplets, including household spray bottles (39) and asthma inhalator.(37)

Some studies considered droplets of 75nm diameter to simulate the coronavirus (35, 36), which might not take into account that the virus is more likely to be transmitted through larger droplets or aerosols. Other studies have considered this, simulating droplets of 4-5µm.(41) Not all studies specified the size of the particles.

Diverse materials were tested, including different types of cotton, kitchen paper, synthetic fabric, silk, and clothes items such as T-shirt or bed sheet, and with different layer arrangement (1-layer, multi-layer and hybrid approaches), but the materials assessed were

not consistently described in the studies. All studies included medical masks (surgical or/and N95) as a reference. Cotton was the material most studied, with some studies suggesting similar filtering properties to medical masks, and other showing lower efficiency. Difference in results might be explained by the weave intensity of the cotton, with denser fabric providing similar filtering properties to medical masks.(34, 35)

One of the most comprehensive laboratory studies identified here assessed the filtration efficacy of particles in the range of 10nm to 10µm, at 2 different flow rates representative of respiration rates at rest and during moderate exertion.(34) Different types of fabrics (cotton, silk, synthetic fabric, etc) and combinations were tested, with hybrid approaches (cotton/silk, cotton/chiffon, cotton/flannel) showing superior filtering efficiency than N95 for particles smaller than 300nm. This study is also the only one which assessed the effect of improper mask fitting on the filtering efficiency of cloth masks, showing that gaps can result in over a 60% decrease in the filtration efficiency, with similar trends observed in surgical masks and cotton/silk hybrid sample.(34)

Using a different testing method and different materials, Ma et al showed that homemade masks made of 4-layer kitchen papers and 1-layer polyester cloth can block 95% of avian influenza virus in aerosol, compared to 97% for medical masks.(41)

Due to the heterogeneity between studies, including differences in testing methods, aerosol generations, materials used, information provided on the material, etc, it is not possible to directly compare the results between studies, nor to reliably assess the efficacy of each material as function of the number of layers. Overall, laboratory studies provided mechanistic evidence that materials such as cotton and polyester can block droplets reasonably well and that 2 or 3 layers of cotton (high density), polyester (or a mix of both such as in a T-shirt), silk, chiffon, flannel, or combinations of these materials, might provide similar filtering efficiency than commercial medical masks.(34, 37, 39)

Laboratories studies do not take into account real-life settings and only provide mechanistic evidence which should be considered with caution. In addition, 3 of the 8 laboratory studies identified have not been peer-reviewed and there was heterogeneity between studies in terms of testing procedures and materials. As a result, this body of evidence should be considered as weak evidence.

Finally, it has to be noted that even though these studies have been conducted, or at least published, during the COVID-19 outbreak, they do not constitute direct evidence from COVID-19 as none of them assessed the efficacy of different cloth masks with participants infected with SARS-CoV-2.

Limitations

The literature search was limited to evidence drawn from COVID-19 published between 25 March and 5 June 2020. The studies identified provide weak evidence based on their design (no RCTs and no prospective cohorts identified), quality (risk of bias in observational studies; modelling and laboratories studies provide only theoretical evidence) and publication status (15 out of 28 studies were non-peer-reviewed preprints;). In addition, the observational studies did not provide detail on the types of masks used or on compliance and do not permit a distinction between source control and prevention.

The limitations of modelling studies are to also be fully considered, and we feel it is necessary to highlight the precautions that should be taken when interpreting their results. Though the results offer what appears to be good evidence supporting the use of masks in the community, it is imperative that they are recognised as estimates, and viewed only in support of the observational evidence. We, therefore, cannot recommend the use of modelling studies alone as evidence to inform or change policy measures.

The evidence identified on the efficacy of different types of face coverings for use in the community was only from laboratories studies. While these studies have been conducted, or at least published, during the COVID-19 outbreak, they do not constitute direct evidence from COVID-19 as none of them assessed the efficacy of different cloth masks with participants infected with SARS-CoV-2. These studies should therefore be assessed within the broader body of evidence and, to do so, a literature search should be completed to include evidence published before 25 March 2020.

Conclusions

There is weak evidence from observational and modelling studies that that community-wide mask wearing may contribute to reducing the spread of COVID-19 and that interventions early in a pandemic might be associated with lower peak infection rate. The beneficial effects of wearing masks may increase when combined with other non-pharmaceutical interventions, such as social distancing or hand washing.

Based on laboratories studies, materials such as cotton or polyester might block droplets with a filtering efficiency similar to medical masks when folded in 2 or 3 layers. However, direct evidence from higher quality studies is needed to confirm this mechanistic evidence.

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Annex 1. Methods

Literature search

This report employed a rapid review approach to address the review questions:

Q1. What is the effectiveness of face covering to reduce the spread of COVID-19 in the community?

Q2. What is the efficacy of different types of masks?

Notes

- A number of systematic reviews have recently been conducted to assess the effectiveness of face covering in healthcare and non-healthcare settings. One of the most recent is the review published in the Lancet by Chu et al (1) which has been used by the WHO to update their guidance.(6)
- The search strategy developed by Chu et al was comprehensive and included all study designs as long as they were conducted in pandemic settings (SARS, MERS or COVID-19). They searched Medline, Embase and WHO COVID-19 Research Database up to 26 March 2020 and preprint servers such as MedRxiv up to 3 May 2020.
- It was therefore agreed that for this rapid review, searches would be conducted from 25 March 2020.

Protocol

A protocol was produced by the project team before the literature search began, specifying the research question and the inclusion and exclusion criteria. The protocol is available on request.

Sources searched

Medline, Embase, medRxiv preprints, WHO COVID-19 Research Database

Search strategy

Searches were conducted for papers published **between 25 March 2020 and 5 June 2020**.

Search terms covered key aspects of the research question, including terms related to the intervention. The search strategy for Ovid Medline is presented in Box 1.

Reference lists of relevant systematic reviews were also searched.

Box 1. Search strategy Ovid Medline

1. mask*.tw,kw.
2. (face-mask* or facemask*).tw,kw.
3. ((face or head) adj2 cover*).tw,kw.
4. (face-cover* or facecover*).tw,kw.

5. (cloth* adj2 (cover* or protect*)).tw,kw.

6. physical barrier*.tw,kw.

7. physical intervention*.tw,kw.

8. non-pharmaceutical.tw,kw.

9. (mouth adj2 (cover* or protect*)).tw,kw.

10. (nose adj2 (cover* or protect*)).tw,kw.

11. Masks/

12. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11

13. exp coronavirus/

14. exp Coronavirus Infections/

15. ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw.

16. (coronavirus* or coronovirus* or coronavirinae* or CoV or HCoV*).ti,ab,kw.

17. (2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or COVID-19 or COVID19 or CORVID-19 or CORVID19 or WN-CoV or WNCoV or HCoV-19 or HCoV19 or 2019 novel* or Ncov or n-cov or SARS-CoV-2 or SARSCoV-2 or SARSCoV2 or SARS-CoV2 or SARSCov19 or SARS-Cov19 or SARSCov-19 or SARS-Cov-19 or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or SARS-2 or SARScoronavirus2 or SARS-coronavirus-2 or SARScoronavirus 2 or SARS coronavirus2 or SARScoronovirus2 or SARS-coronovirus-2 or SARScoronovirus 2 or SARS coronovirus2).ti,ab,kw.

18. (respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw.

19. ((seafood market* or food market* or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*)).ti,ab,kw.

20. ((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei or China* or Chinese* or Huanan*)).ti,ab,kw.

21. or/13-20

22. 12 and 21

23. limit 22 to dt=20200325-20200605

Inclusion and exclusion criteria

Article eligibility criteria are summarised in Table 1.

Due to the absence of direct evidence from COVID-19 outbreak related to question 2, it was agreed that laboratory studies assessing filtration properties of different types of cloth masks would be included.

Table 1. Inclusion and exclusion criteria

	Included	Excluded
Population	Human	Non-humans studies
Settings	All community settings, including households	Healthcare settings
Context	COVID-19 disease	Other diseases
Intervention / exposure	All types of face covering, including (but not limited to) handmade and commercial cloth masks (cloth, cotton, gauze, etc), and medical masks	Studies comparing effectiveness of surgical masks to N95 respirators
Outcomes	• Transmission of SARS-CoV-2 • SARS-CoV-2 infection • Basic reproduction number • Mask filtration capacity / droplet transmissions	
Language	English	
Date of publication	25 March 2020 to 5 June 2020	
Study design	• Experimental or observational studies • Modelling studies • Laboratory studies	• Systematic reviews • Guidelines • Opinion pieces
Publication type	Published and preprint	

Screening

Title and abstract screening was done by 2 reviewers: 10% of the eligible studies were screened in duplicate with a 96% agreement (disagreements were resolved by discussion) and the remainder were single screened by 2 reviewers (half each). Full text screening was done by one reviewer and checked by a second. Figure 1 illustrates this process. The list of excluded studies is provided in Annex 2.

Data extraction and quality assessment

Data extraction was done by 1 reviewer.

Due to the rapid nature of the work, a validated risk of bias tool was not used to assess study quality. However, papers were evaluated based on study design and main source of bias (mainly population, selection, exposure and outcome).

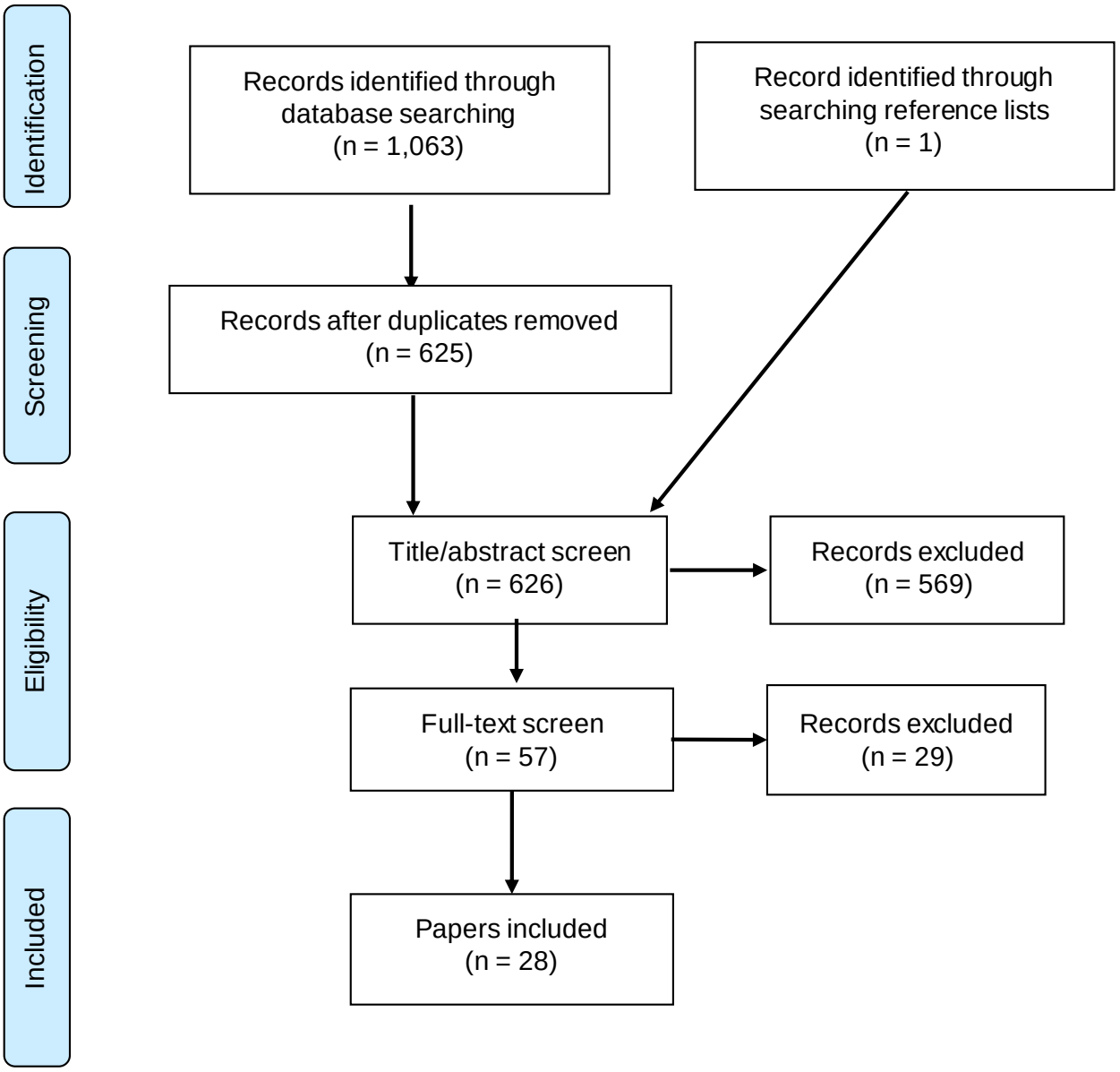

Figure 1. PRISMA diagram

Annex 2. Excluded studies

Reference	Reason for exclusion
Aggarwal et al, Facemasks for prevention of viral respiratory infections in community settings: A systematic review and meta-analysis	Not primary evidence (systematic review)
Amendola et al, A rapid screening method for testing the efficiency of masks in breaking down aerosols	Methodology proposal for testing efficacy of aerosol dissemination in masks.
Bae et al, Notice of Retraction: Effectiveness of Surgical and Cotton Masks in Blocking SARS-CoV-2	Retracted
Bae et al, Effectiveness of Surgical and Cotton Masks in Blocking SARS-CoV-2: A Controlled Comparison in 4 Patients	
Barraclough & Parmar, A new modification of a visor mask for use with a head-light and loupes	Not primary evidence (opinion)
Brainard et al, Facemasks and similar barriers to prevent respiratory illness such as COVID-19: A rapid systematic review	Not primary evidence (systematic review)
Chen et al, Hand Hygiene, Mask-Wearing Behaviors and Its Associated Factors during the COVID-19 Epidemic: A Cross-Sectional Study among Primary School Students in Wuhan, China	Outcome: prevalence & behaviour changes; no results on effectiveness
Chowell et al, Sustainable social distancing through facemask use and testing during the Covid-19 pandemic	Not primary evidence (opinion)
Chu et al, Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis	Not primary evidence (systematic review)
Clase et al, Cloth Masks May Prevent Transmission of COVID-19: An Evidence-Based, Risk-Based Approach	Not primary evidence (opinion)
Cowling et al, Impact assessment of non-pharmaceutical interventions against coronavirus disease 2019 and influenza in Hong Kong: an observational study	Outcome: behaviour & behaviour changes; no results on effectiveness
Di Lorenzo & Di Trolio, Coronavirus Disease (COVID-19) in Italy: Analysis of Risk Factors and Proposed Remedial Measures	Not primary evidence (opinion)
Elachola et al, COVID-19: Facemask use prevalence in international airports in Asia, Europe and the Americas, March 2020	Not primary evidence (letter to editor)
Esposito et al, Universal use of face masks for success against COVID-19: evidence and implications for prevention policies	Not primary evidence (letter to editor)
Grover, Efficacy of face masks depends on spatial relation between host and recipient and who is being protected	Not primary evidence (opinion)
Gunasekaran et al, Prevalence of facemask use among general public when visiting wet market during Covid-19 pandemic: An observational study	Outcome: prevalence; no results on effectiveness

Reference	Reason for exclusion
Gupta et al, The use of facemasks by the general population to prevent transmission of Covid 19 infection: A systematic review	Not primary evidence (systematic review)
Ho et al, Medical mask versus cotton mask for preventing respiratory droplet transmission in micro environments	Mentioned COVID-19 but no direct evidence from COVID-19
Jefferson et al, Physical interventions to interrupt or reduce the spread of respiratory viruses. Part 1 - Face masks, eye protection and person distancing: systematic review and meta-analysis	Not primary evidence (systematic review)
Kamata et al, Universal public use of surgical mask and respiratory viral infection Universal public use of surgical mask and respiratory viral infection	No direct evidence from COVID-19 (Cross-sectional survey, Japan, 2017)
Kim, What Type of Face Mask Is Appropriate for Everyone-Mask-Wearing Policy amidst COVID-19 Pandemic?	Not primary evidence (opinion)
Leung et al, Respiratory virus shedding in exhaled breath and efficacy of face masks	No direct evidence from COVID-19 and surgical masks only
Liang et al, Efficacy of face mask in preventing respiratory virus transmission: A systematic review and meta-analysis	Not primary evidence (systematic review)
MacIntyre & Chughtai, A rapid systematic review of the efficacy of face masks and respirators against coronaviruses and other respiratory transmissible viruses for the community, healthcare workers and sick patients	Not primary evidence (systematic review)
Matusiak et al, Inconveniences due to the use of face masks during the COVID-19 pandemic: a survey study of 876 young people	Outcome: inconvenience; no results on effectiveness
Mondal et al, Utility of Cloth Masks in Preventing Respiratory Infections: A Systematic Review	Not primary evidence (systematic review)
Pleil et al, The scientific rationale for the use of simple masks or improvised facial coverings to trap exhaled aerosols and possibly reduce the breathborne spread of COVID-19	Not primary evidence (editorial)
Stern et al, [Rapid review of the use of community-wide surgical masks and acute respiratory infections]	Not primary evidence (systematic review)
Szarpak et al, Cloth masks versus medical masks for COVID-19 protection	Not primary evidence (letter to editor)