

## Effectiveness of the use of non-woven face mask to prevent coronavirus infections in the general population: a rapid systematic review

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**Abstract** *Objectives: to evaluate the effectiveness of non-woven face masks for the prevention of respiratory infections (MERS CoV, SARS-CoV, and SARS-CoV-2) in the population. Methods: search in Medline, Embase, Cinahl, The Cochrane Library, Trip databases. Google Scholar, Rayyan and medRxiv were also consulted for complementary results. No filters related to date, language or publication status were applied. Titles and abstracts were screened, and later, full texts were evaluated. Results: three studies were included: a randomized cluster clinical trial and two systematic reviews. The clinical trial indicates a potential benefit of medical masks to control the source of clinical respiratory disease infection. In one of the systematic reviews, it was not possible to establish a conclusive relationship between the use of the mask and protection against respiratory infection. Finally, another systematic review indicated that masks are effective in preventing the spread of respiratory viruses. Conclusion: Evidence points to the potential benefit of standard non-woven face masks. For the current pandemic scenario of COVID-19, education on the appropriate use of masks associated with individual protection measures is recommended.*

**Key words** *Coronavirus of Middle East Respiratory Syndrome, Severe acute respiratory syndrome, Coronavirus, Masks, Prevention*

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## Introduction

Since the first COVID-19 infection outbreak was acknowledged – registered in December 2019, at Wuhan, Mainland China –, there has been a great challenge on the use of Personal Protective Equipment (PPE) to prevent the spreading of the SARS-CoV-2 respiratory infection via droplets and aerosol during the COVID-19 pandemic<sup>1,2</sup>.

According to the International Sanitary Regulation (IRS), to assure maximum safety against the transmission of this disease, due to the high morbidity and mortality rates caused by SARS-CoV-2, measures were adopted to reduce its effects and negative impacts on the population. In order to broaden priority actions, Brazil started to create technical norms for the use of personal protective equipment against the current pandemic, including the guidelines for the use of surgical and protective masks<sup>3</sup>.

During this time, studies focused on which type of mask should be made available to prevent the spreading of the pandemic. The so-called surgical masks protect against infectious agents transmitted by droplets. They are disposable, made for personal use, and filters bacteria up to 98%, as recommended by the NE-14683 European Standard. These surgical masks must have three independent layers of “spunbond-melt-blown-spunbond” (non-woven fabric used for dental, medical and hospital operations), in compliance with the Brazilian norm ABNTNBR 15052<sup>4</sup>.

The other type of mask, categorized as “protective mask”, is known as N95 or FFP 2 (filtering facepiece), or equivalent, personal respirator and follows the EN-149: 2991 European Standard. This respirator broadens the specter for filtering aerosol and, depending on the standards and laws of each country, can be reused. It protects against infectious agents transmitted through droplets, and prevents inhaling airborne infectious agents (aerosol) and droplets the same size or smaller than 5µm<sup>4,5</sup>.

Due to a global lack of supplies, the World Health Organization now recommends the use of masks for the general population. However, what are the available evidences of non-woven masks in preventing respiratory diseases caused by coronaviruses (MERS CoV, SARS-CoV and SARS-CoV-2) to the general population? This question takes into account the comparison of non-woven mask use with other face masks or non-face mask use at all.

Masks for non-health workers are the ones made with two-layer fabric and with “spunbond”, a type of non-woven that cannot filter agents inside dental, medical and hospital facilities. They are not recommended for healthcare professionals and should be restricted for non-professionals, to protect them against respiratory diseases like COVID-19<sup>6</sup>.

Thus, the objective of this systematic review is to evaluate and gather the available scientific evidence regarding face masks efficacy for the prevention of respiratory diseases caused by MERS CoV, SARS-CoV e SARS-CoV-2 to the general population.

## Methods

### Inclusion criteria

Studies as systematic reviews, meta-analysis, clinical trials, randomized or not (humans) or observational – which evaluated the use of non-woven face masks or the non-use of masks by the general population to prevent viral respiratory diseases (MERS-CoV, SARS-CoV e SARS-CoV-2) were considered for inclusion in the present review. Filters related to date, language or publishing status were not applied (Chart 1).

### Exclusion criteria

Studies evaluating healthcare professionals, surgical masks, N95 or FFP respirators, as well as pre-clinical studies, or laboratory studies, assessment of health technology, editorials, commentary or opinion studies, and narrative reviews were excluded (Chart 2).

### Information sources and search strategies

The search was conducted on the following databases: Medline/Pubmed, Embase, Cinahl, The Cochrane Library and Trip Database. Search strategies used a combination of subject headings and free text terms to address the following subjects “Coronavirus”, “Covid-19”, “Acute Respiratory Distress Syndrome” and “Masks”. Google Scholar, Rayyan, medRxiv were used as a complementary search. The searches were conducted on April 2nd, 2020 and were last updated on April 8, 2020 (Chart 3).

**Chart 1.** Inclusion criteria for studies.

Population	General population
Intervention	Non-woven face masks
Outcome	Efficacy of protection against MERS-CoV/SARS-CoV/SARS-CoV-2 respiratory diseases. Comprise contamination by MERS-CoV/SARS-CoV/SARS-CoV-2-type respiratory diseases.
Type of Study	Systematic review: meta-analysis Clinical trials, randomized or not (humans) Observational
Time	Any time

**Chart 2.** Exclusion criteria for Studies.

Population	Does not comprise the general population Healthcare professionals
Intervention	Do not cover non-woven face masks Surgical and N95 masks
Outcome	Does not assess efficacy of protection against MERS-CoV/SARS-CoV/SARS-CoV-2. Does not assess contamination by MERS-CoV/SARS-CoV/SARS-CoV-2-type respiratory diseases. H1N1 Respiratory viruses other than MERS-CoV/SARS-CoV/SARS-CoV-2
Type of study	Editorial; narrative literature review; laboratorial, health technology assessments
Time	Does not apply

## Results

### Selecting studies

After databases and complementary searches, 1,132 studies were identified; after duplicate exclusion, 679 articles were screened by title and abstract. The remaining 69 articles were read in full and 17 were selected for data extraction. However, in the end, only 3 studies fulfilled inclusion/exclusion criteria: 1 randomized cluster clinical trial<sup>7</sup> and 2 systematic reviews<sup>8,9</sup>.

### Randomized clinical trial

MacIntyre et al.<sup>7</sup> is a randomized cluster clinical trial about the risk of infection by respiratory diseases similar to influenza among people who live with an infected person. The intervention was the comparison of mask use with non-mask use. No statistically significant results comparing the use of masks and risk of infection were found. However, there were relevant results for mask use and risk reduction to develop influenza-like respiratory diseases.

In the intention-to-treat analysis, the relative risk (RR) for clinical respiratory disease was [0.61, 95% CI 0.18 - 2.13], ILI RR [0.32, 95% CI 0.03 - 3.13], and for laboratory-confirmed viral infections was RR [0.97, 95% CI 0.06 - 15.54], which were consistently lower in the mask group in comparison with the no mask group, although not statistically significant. The viruses were isolated in 60% (146/245) of the index cases. Influenza was the most common virus isolated from 115 participants (47%): influenza A, 100; influenza B, 1, and influenza A and B, 4. Other isolated viruses from the index cases were rhinovirus, NL63 and C229E. More than one virus was isolated in 48 (20%) index cases, including 17 influenza co-infections.

The study's risk of bias assessment using the ROB 2.0<sup>10</sup> tool was evaluated as unclear. Even though the research presents methodological rigor, the study does not provide clear information on the randomization method of the evaluated participants. Moreover, in addition to the use of masks, the intervention group received information on frequent hand washing. This may have contributed to the observed difference, even if

**Chart 3.** Search strategies used for each database and number of findings.

Database/date	Search strategy	Results
Medline/PubMed 02/04/2020	<p>1. (“Masks”[Mesh] OR mask*[TIAB] OR facemask*[TIAB] OR “surgical mask”[TIAB] OR “surgical masks”[TIAB] OR “respiratory protection”[TIAB] OR “respiratory protective device”[ TIAB] OR “respiratory protective devices”[TW] OR “personal protective equipment”[TW] OR PPE[TIAB] OR “face protection”[TIAB] OR ((airborne OR droplet) AND (precaution* OR protect*)))</p> <p>2. (“coronavirus infections”[MeSH] OR “COVID-19”[Title/Abstract] OR “2019 novel coronavirus”[Title/Abstract] OR “COVID19”[Title/Abstract] OR “coronavirus disease”[Title/Abstract] OR nCoV[Title/Abstract] OR “severe acute respiratory syndrome coronavirus”[Title/Abstract] OR (Wuhan[TIAB] AND (coronavirus* OR covid)) OR SARS[TW] OR “SARS Virus”[MeSH Terms] OR “Severe Acute Respiratory Syndrome”[MeSH] OR “Middle East Respiratory Syndrome Coronavirus”[Mesh] OR “Coronavirus”[Mesh] OR MERS[TW] OR “Middle East respiratory syndrome”[TIAB]) = 214</p> <p>3. #1 AND #2</p>	400
Embase/ (Embase.com) 02/04/2020	<p>1. ‘mask’/exp</p> <p>2. mask*:ti,ab,kw OR ‘face mask’:ti,ab,kw OR ‘surgical mask’:ti,ab,kw OR ‘respiratory protection’:ti,ab,kw OR ‘face protection’:ti,ab,kw</p> <p>3. coronavirus infection’/exp OR ‘severe acute respiratory syndrome’/exp OR ‘sars-related coronavirus’/exp OR ‘middle east respiratory syndrome coronavirus’/exp</p> <p>4. ‘covid 19’:ti,ab OR ‘2019 novel coronavirus’:ti,ab OR covid19:ti,ab OR ‘coronavirus disease’:ti,ab OR ncov:ti,ab OR ‘severe acute respiratory syndrome coronavirus’:ti,ab</p> <p>5. Wuhan AND (coronavirus:ti,ab,kw OR covid:ti,ab,kw)</p> <p>6. sars:ti,ab OR mers:ti,ab OR ‘middle east respiratory syndrome’:ti,ab</p> <p>7. [embase]/lim NOT (([embase]/lim AND [medline]/lim)</p> <p>8. #1 or #2</p> <p>9. #3 or #4 or #5 or #6</p> <p>10. #8 and #9</p> <p>11. #10 and #7</p>	81
Cinahl 02/04/2020	<p>1. MH “Masks+” OR TI mask* OR AB mask* OR TI facemask* OR AB facemask* OR TI “surgical mask” OR AB “surgical mask” OR TI “surgical masks” OR AB “surgical masks” OR TI “respiratory protection” OR AB “respiratory protection” OR TI “face protection” OR AB “face protection”</p> <p>2. (MH “coronavirus infections+”) OR TI COVID-19 OR AB COVID-19 OR TI “2019 novel coronavirus” OR AB “2019 novel coronavirus” OR TI COVID19 OR AB COVID19 OR TI “coronavirus disease” OR AB “coronavirus disease” OR TI nCoV OR AB nCoV OR TI “severe acute respiratory syndrome coronavirus” OR AB “severe acute respiratory syndrome coronavirus” OR ((TI Wuhan OR AB Wuhan AND (coronavirus* OR covid)) OR SARS OR (MH “SARS Virus+”) OR (MH “Severe Acute Respiratory Syndrome+”) OR (MH “Middle East Respiratory Syndrome Coronavirus+”) OR (MH “Coronavirus+”) OR MERS OR TI “Middle East respiratory syndrome” OR AB “Middle East respiratory syndrome”)</p> <p>3. #1 and #2</p>	117

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not statistically significant. The study points to a potential benefit with medical masks for the disease control, however, it is limited by low sample size and low secondary attack rates (SAR)<sup>7</sup>.

### Systematic reviews

The review carried out by Benkouiten *et al.*<sup>8</sup> assessed the use of nonpharmaceutical interven-

**Chart 3.** Search strategies used for each database and number of findings.

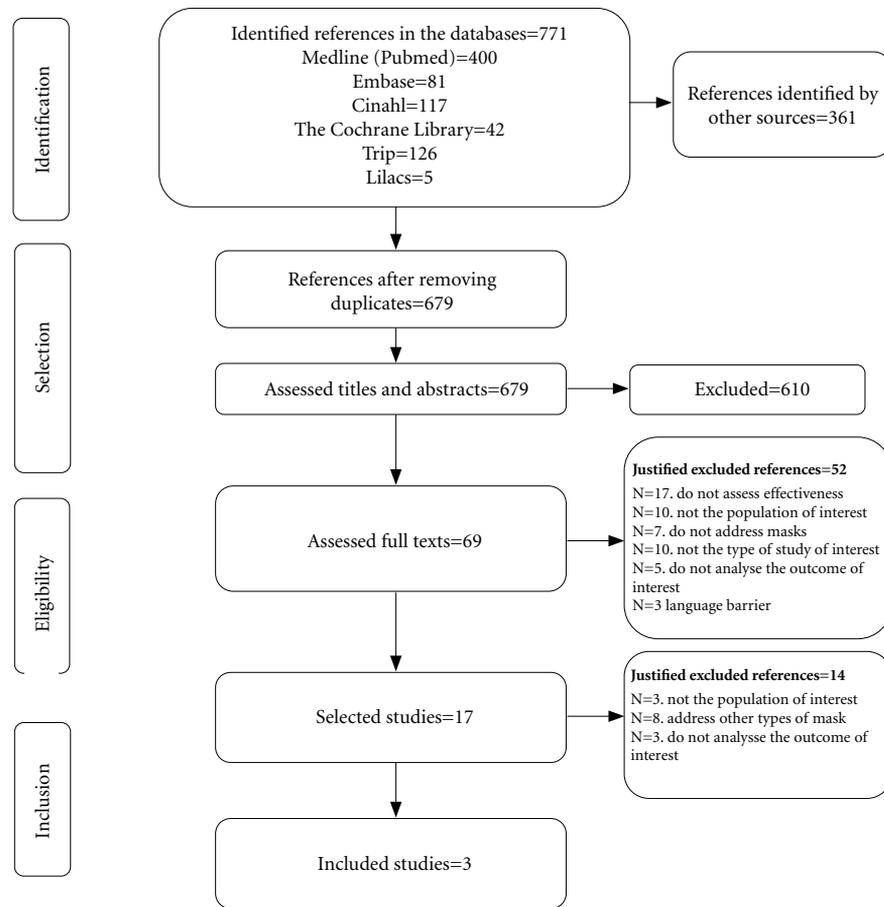
Database/date	Search strategy	Results
The Cochrane Library 02/04/2020	1. MeSH descriptor: [Masks] explode all trees 2. (mask*):ti,ab,kw OR (facemask*):ti,ab,kw OR (“surgical mask”):ti,ab,kw OR (“surgical masks”):ti,ab,kw 3. #1 or #2 4. MeSH descriptor: [Coronavirus] explode all trees 5. MeSH descriptor: [Coronavirus Infections] explode all trees 6. MeSH descriptor: [Severe Acute Respiratory Syndrome] explode all trees 7. MeSH descriptor: [Middle East Respiratory Syndrome Coronavirus] explode all trees 8. MeSH descriptor: [SARS Virus] explode all trees 9. (COVID-19):ti,ab,kw OR (COVID19):ti,ab,kw OR (“2019 novel coronavirus”):ti,ab,kw OR (“coronavirus disease”):ti,ab,kw OR (“severe acute respiratory syndrome coronavirus” or SARS):ti,ab,kw 10. #4 OR #5 OR #6 OR #7 OR #8 OR #9 11. #3 AND #10 Estratégiamaisampla: (COVID-19):ti,ab,kw OR (COVID19):ti,ab,kw OR (“coronavirus”):ti,ab,kw AND (MASK*):ti,ab,kw	42
Lilacs	(mask* or mascara* or barbijo*) and (covid or coronavirus or sars)	5
Trip 02/4/2020	(mask* or facemask*) and (coronavirus or covid)	126
Rayyan [Public] 2020-03-28: Review containing the “COVID-19 Open Research Dataset” metadata (45774 articles) 02/04/2020	Busca por: Mask* Seleção prévia por títulos eliminado inconsistências	354
Google Scholar 08/04/2020	(mask* or facemask*) and (coronavirus or covid)	4
medRxiv	(mask* or facemask*) and (coronavirus or covid)	3

tions (NPIs) for respiratory tract infections (RTI) prevention during the pilgrimage to Hajj, Mecca. The review included 17 studies which conducted descriptive analysis of the results. Several prevention measures against respiratory tract infections were analyzed, including face mask use. The results on mask effectiveness for respiratory tract infections prevention were conflicting. According to the applied tool for critical appraisal (AMSTAR 2)<sup>11</sup>, the review presented a low methodological quality.

Face masks effectiveness to prevent respiratory disease transmission similar to influenza and RTIs relies on many aspects, such as its strict and correct use and hand washing. Although most studies included in the aforementioned review have pointed out that mask use was associated

with a reduced risk of severe acute respiratory syndrome, none of them presented a conclusive relation between mask use and protection against respiratory diseases similar to influenza. Nonetheless, Benkouiten et al.<sup>8</sup> recommend that face masks should be consistently and correctly used from the very beginning of pilgrimage, even though the available studies do not provide strong evidence of its effectiveness in preventing viral respiratory infections.

The systematic review conducted by Liang et al.<sup>9</sup> assessed mask use and the association with infection by respiratory coronavirus of the severe acute respiratory syndrome (SARS-CoV), influenza, H1N1 and SARS-CoV-2. The 21 included studies that reported the use of mask effectiveness observed 8,686 subjects. In general, masks



**Figure 1.** Searching for and selecting studies flowchart.

are effective in preventing the spread of respiratory viruses: after the use of mask, the risk of viral respiratory infection was significantly reduced in 35% [OR = 0.35, 95% CI = 0.24-0.51,  $I^2 = 60\%$ ]. In the healthcare workers subgroup, the protective effect was more significant, with risks of infection reduced by 20% [OR = 0.20, 95% CI = 0.11-0.37,  $I^2 = 59\%$ ]. In a study on COVID-19, the risk of infection reduced by 4% [OR = 0.04, 95% CI = 0.00-0.60]. In the non-healthcare workers subgroup, there was a protective effect, with risks of infection 53% lower [cluster OR = 0.53, 95% CI = 0.36 - 0.79,  $I^2 = 45\%$ ]. A more thorough description found significant effects in the household subgroup, with 60% lower risk of respiratory viral infections [OR = 0.60, 95% CI = 0.37-0.97,  $I^2 = 31\%$ ] and non-household subgroup, with 44% lower risk [OR = 0.44, 95% CI = 0.33-0.59,  $I^2 = 54\%$ ]. One study included health-

care workers and patients' family members, with 74% lower risk of infection by respiratory viral diseases [OR = 0.74, 95% CI: 0.29-1.90].

By geographic locations, beneficial effects of the mask use were found in Asia (31% lower risk) [OR = 0.31, 95% CI = 0.19-0.50,  $I^2 = 65\%$ ] and in Western countries (45% lower risk) [OR = 0.45, 95% CI = 0.24-0.83,  $I^2 = 51\%$ ]. Healthcare workers in Asia (21% lower risk) [OR = 0.21, 95% CI = 0.11-0.41,  $I^2 = 64\%$ ] and in Western countries (11% lower risk) [OR = 0.11, 95% CI = 0.02-0.51,  $I^2 = 0\%$ ] may have significantly reduced the risks by using masks. In the non-healthcare workers subgroup, a protective effect was observed in Western countries (46% lower risk) [OR = 0.46, 95% CI = 0.34-0.63,  $I^2 = 57\%$ ] and in Asia (51% lower risk) [OR = 0.51, 95% CI = 0.34-0.78,  $I^2 = 45\%$ ]. Masks showed protective effect against influenza virus (55% lower risk) [OR = 0.55,

**Chart 4.** Non-wovenface mask effectiveness for the general population to prevent SARS-CoV-2 infections and assessment of the methodological quality of studies.

Author, year	Type of Study	Population	Mask Type	Associated/secondary interventions	Comparator	Outcome	Main results	Assessment of the methodological quality/ Tool
MacIntyre CR et al. 2016	Randomized cluster-type clinical trial	Patients from 18 year of age on with ILI (body temperature $\geq 38^{\circ}$ C plus one respiratory symptom, including cough, nasal congestion, coryza, sore throat or sneezes) who attended an outpatient clinic during the study period, without history of ILI among family members in the previous 14 days and who lived with at least two other people at home	3M 1817 Surgical Mask	Hand washing when wearing or removing the mask	Non-mask use	Clinical symptoms of respiratory disease, ILI and laboratory-confirmed viral respiratory infection	In intention-to-treat analysis, clinical respiratory disease rates of [relative risk (RR) 0.61, 95% CI 0.18 to 2.13], ILI [RR 0.32, 95% CI 0.03 to 3.13] and laboratory-confirmed viral infections [RR 0.97, 95% CI 0.06 to 15.54] were consistently lower in the mask group compared to the control group, although not statistically significant. Viruses were isolated from 60% (146/245) of the index cases. Influenza was the most common virus isolated from 115 (47%) cases - influenza A - 100, influenza B - 11 and influenza A and B - 4. Other viruses isolated from index cases were rhinovirus, NL63 and C229E. More than one virus was isolated in 48 (20%) index cases, including 17 influenza co-infections.	Unclear risk of bias. Although they are an apparent methodological rigorous investigations, information about the randomization method of the research subjects is not provided. In addition, the intervention group, associated with the use of masks, also received information on frequent hand washing. This may have contributed to the noted difference, even if not a statistically significant one. The t 3M contributed with masks and respirators supplies and the study received research grants and laboratory tests from Pfizer, GSK and Bio-CSL. One of the authors also received funding for the GSK vaccine, bio-CSL and Sanofi Pasteur to conduct the research / ROB 2.0

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**Chart 4.** Non-wovenface mask effectiveness for the general population to prevent SARS-CoV-2 infections and assessment of the methodological quality of studies.

Author, year	Type of Study	Population	Mask Type	Associated/secondary interventions	Comparator	Outcome	Main results	Assessment of the methodological quality/ Tool
Benkouiten S et al. 2014	Systematic review	Pilgrims (regardless of age and sex) from the Hajj Muslim festival	Surgical mask (no description)	Hand hygiene, cough etiquette and disposable tissue, social distancing and contact prevention, Hajj postponement for populations at risk	Lack of nonpharmaceutical interventions	Preventive effect on respiratory infectious diseases	The effectiveness of face mask use in preventing respiratory disease during Hajj was assessed in several studies. However, the results were conflicting. A study among Indonesian pilgrims reported that those who did not use a face mask during Hajj had three times more risk of getting an acute upper respiratory tract infection compared to those with face masks. A significant reduction in respiratory symptoms was also observed in a Saudi study, while several other studies reported no significant effect. A second Saudi study showed a significant reduction in respiratory symptoms with face mask use, but only in the male or total sample, not in the female group. Two other studies addressed the impact of face mask use during Hajj on the prevalence of respiratory symptoms and viral pathogens using PCR assays of pilgrims' nasal samples, and no significant effects were observed.	Study of low quality. The review does not present methodological and systematic rigor /AMSTAR

it continues

**Chart 4.** Non-woven face mask effectiveness for the general population to prevent SARS-CoV-2 infections and assessment of the methodological quality of studies.

Author, year	Type of Study	Population	Mask Type	Associated/secondary interventions	Comparator	Outcome	Main results	Assessment of the methodological quality/ Tool
Liang M, et al. 2020	Systematic review and meta-analysis	Healthcare workers and non-healthcare workers in Asia and Western countries	Face mask (no specification)	Influenza vaccination, hand hygiene	Not using masks	Viral respiratory infection (influenza, SARS, SARS-CoV-2 e H1N1) diagnosed in laboratory	After wearing a mask, the risk of getting viral respiratory infection was significantly reduced: OR was 0.35 and 95% CI = 0.24-0.51 [I <sup>2</sup> = 60%, random effect MH model]. Only in the subgroup of healthcare workers, the protective effect was more obvious, with an OR of 0.20 [95% CI = 0.11-0.37, I <sup>2</sup> = 59%]. In a study about COVID-19, the OR was 0.04 (95% CI = 0.00-0.60). In the subgroup of non-healthcare workers, a protective effect was found with the cluster OR of 0.53 [95% CI = 0.36 - 0.79, I <sup>2</sup> = 45%]. A more detailed description found significant effects in the household subgroup [OR = 0.60, 95% CI = 0.37-0.97 I <sup>2</sup> = 31%] and the non-household subgroup [OR = 0.44, 95% CI = 0.33-0.59 I <sup>2</sup> = 54%]. One study included healthcare workers and family members of patients, with an OR of 0.74 [95% CI: 0.29-1.90]. By geographic locations, positive effects of masks protection were found in Asia [OR = 0.31, 95% CI = 0.19-0.50, I <sup>2</sup> = 65%] and in Western countries [OR = 0.45, 95% CI = 0.24-0.83, I <sup>2</sup> = 51%]. Healthcare professionals in Asia [OR = 0.21, 95% CI = 0.11-0.41, I <sup>2</sup> = 64%] and in Western countries [OR = 0.11, 95% CI = 0.02-0.51, I <sup>2</sup> = 0%] can significantly reduce the risk by using masks. In the non-healthcare workers subgroup, protection was found in Western countries [OR = 0.46, 95% CI = 0.34-0.63, I <sup>2</sup> = 57%] and Asia [OR = 0.51, 95% CI = 0.34-0.78, I <sup>2</sup> = 45%]. The masks presented a protective effect against influenza viruses [OR = 0.55, 95% CI = 0.39-0.76, I <sup>2</sup> = 27%], SARS [OR = 0.26, 95% CI = 0.18 -0.37, I <sup>2</sup> = 47%] and SARS-CoV-2 [OR = 0.04, 95% CI = 0.00-0.60, I <sup>2</sup> = 0%]. However, there was no significant protective effect against H1N1 [OR = 0.30, 95% CI = 0.08-1.16, I <sup>2</sup> = 51%].	Low risk of bias. The study presents high methodological rigor in the systematic review and meta-analysis, with a clear and adequate description of the methodology / AMSTAR

95% CI = 0.39-0.76,  $I^2 = 27\%$ ], SARS (26% lower risk) [OR = 0.26, 95% CI = 0.18-0.37,  $I^2 = 47\%$ ] and SARS-CoV-2 (4% lower) [OR = 0.04, 95% CI = 0.00-0.60,  $I^2 = 0\%$ ]. However, no significant protective effect against H1N1 was observed [OR = 0.30, 95% CI = 0.08-1.16,  $I^2 = 51\%$ ] (9). The critical appraisal carried out through AMSTAR 2 (11) indicates the high quality of this systematic review.

## Discussion

### Evidence synthesis

The results regarding masks effectiveness were conflicting. This initially happened due to the lack of definition of mask types used in the studies: most refer to them only as 'masks' or 'face masks'. Nonetheless, there was a significant result for non-woven face mask use linked to the risk reduction of influenza-like respiratory illness. The use of non-woven face masks has been identified as an important barrier against droplet and aerosol dispersion related to COVID-19, even without filtration capacity for dental, medical and hospital environments<sup>4</sup>.

Another key element is that the mask use does not reduce or substitute the need for the prescribed hygiene measures, especially hand washing, and more than 1-meter (3.3 feet) distance from one another in public spaces. Moreover, non-woven masks must be affordable for the general population. Other aspects should also be assessed, such as the type of material and 20 to 40 g/m<sup>2</sup> grammage, as recommended by AN-VISA (Brazilian Health Regulatory Agency). The manufactured product must be in 3 layers: a layer of non-waterproof fabric on the front, breathable fabric in the middle and a cotton fabric on the part in contact with the face surface<sup>5</sup>.

## Conclusion

The evidence found in this systematic review points to a potential benefit in the use of non-woven mask by the general population to prevent the COVID-19. However, there are limitations due to the small number of articles available and the low-quality methods of two of the studies assessed, which presented several biases that jeopardize them. In this COVID-19 pandemic scenario, the population should be provided with the following instructions: the current World Health Organization (WHO) recommendations or local guidelines; education on the proper use of masks; education on the adequate use of non-woven masks and/or other types of masks as an auxiliary method, associated with hand washing and other individual protection measures. However, further investigations on the effectiveness of non-woven masks compared to other types of masks for the general population are important, in order to provide guidelines on protection measures against the COVID-19 epidemic.

### Strengths and limitations of the systematic review

This systematic review presents methodological precautions, such as important databases research and methodological quality assessment of the included studies used for this paper. Nevertheless, there were some restricting aspects, such as the low number of articles and low methodological quality of two of them. Even though the evidence considered for this systematic review points to potential benefits of non-woven mask use for COVID-19 prevention by the general population, it is not possible to establish a conclusive result, since there are only few primary studies addressing non-woven face masks, and or other types of masks, compared to non-mask use to prevent SARS-CoV-2 in the general population.

## Collaborations

The authors MC Camargo, MS Martinez-Silveira, AA Lima participated in the elaboration of the project, data collection, data analysis and article writing, BP Bastos, DL Santos, SEC Mota participated in the data analysis and article writing, RB Silva, IP Toledo guided all stages of the work and participated in the review and writing of the article.

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