

# Impact of the Introduction of the Mask Against COVID-19: a Narrative Review

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## Abstract

The objective of this work was to identify the impact of the introduction of the mask against COVID-19. A review of the literature available in a specialized database, PUBMED, was carried out, which was adjusted to the guidelines framed in the PRISMA methodology [1]. Search equations were defined under the terms MeSH: human (MeSH D006801), COVID-19 (MeSH D000086382), masks (MeSH D008397), SARS-CoV-2 (MeSH D000086402) and equipment design (MeSH D004867), using the Boolean AND character. With these equations, articles published in 2020 were searched, recovering 676 records in total, choosing 82 that address the topic of interest and including in the final review 49 articles that met all the defined inclusion and exclusion criteria. The results suggest that the introduction of masks had a positive impact on reducing the risk of COVID-19 and the inappropriate use of masks is a risk factor.

**Keywords:** masks (mesh d008397); covid-19 (mesh d000086382); sars-cov-2 (mesh d000086402); n95 respirators (mesh d000087162). source: mesh, nlm

## Introduction

There is currently scientific evidence that the use of face masks has an effect against COVID-19. The question is: what was the impact of its introduction? This document is a narrative review of the bibliography available in a specialized database under the guidelines framed in the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-

Analyses). Articles were searched in PUBMED between December 1 and 3, 2020 through MeSH (Medical Subjects Headings) specialized medical descriptors: human, COVID-19, masks, SARS-CoV-2 and equipment design. The descriptor Mexico was used to compress the filter. The search equations were built with the use of the boolean character AND (table 1).

| Search equation  | RESULTS  |          |          |          |
|--|----------|----------|----------|----------|
|  | Articles | Repeated | Excluded | Included |
| Humans AND COVID-19 AND SARS-CoV-2 AND Masks                       | 493      | 2        | 420      | 73       |
| Humans AND COVID-19 AND SARS-CoV-2 AND Equipment design            | 173      | 8        | 167      | 6        |
| Humans AND COVID-19 AND SARS-CoV-2 AND Masks AND Mexico            | 8        | 1        | 7        | 1        |
| Humans AND COVID-19 AND SARS-CoV-2 AND Equipment design AND Mexico | 3        | 0        | 2        | 1        |
| TOTALS   | 677      | 11       | 596      | 81       |

**Table 1:** Own authorship. Search equations and results in the PUBMED database.

The inclusion criteria were: articles that contain at least two keywords in their title, studies that related the use of face masks to prevent the spread of COVID-19 and studies in patients already infected in relation to the use of face masks. Articles written in English, Spanish or Portuguese were gathered. The exclusion criteria were: opinion articles without scientific support or statistical analysis, published in another language than those mentioned above, and studies focused on risk groups or chronic diseases. Articles on the materials of the masks or their maintenance were also discarded.

The following was extracted from each article: name of the journal, author, year and country of publication, objective, methodology, variables and results. Likewise, they were classified by topic: incidence studies, case analysis studies and qualitative articles.

**Results**

Search, selection and inclusion of publications Taking into account the information flow diagram through the different phases of a literature review proposed by the PRISMA methodology, Figure 1

|  |  |   |                |
|--|--|---|----------------|
| Records identified by searching the database   |  | Additional records identified through other sources | IDENTIFICATION |
| N=677  |  | (Google Scholar) N=1                                |                |
| Records after eliminating duplicates N=11  |  |   | REVISION       |
| Número total de registros recuperados a texto completo y examinados mediante los criterios de inclusión y exclusión N=82 |  | Total number of deleted records or quotes N=596     |                |
| Total number of full text articles to assess their eligibility N=49  |  | Total number of excluded full-text articles N=33    | ELEGIBILITY    |
| Total number of studies included in the qualitative synthesis of the narrative review N=2                                |  | Systematic reviews N=4                              | INCLUDED       |
| Total number of studies included in the quantitative synthesis of the narrative review N=43                              |  |   |                |

**Figure 1:** Modified from the PRISMA declaration (1). Source selection flow.

contains the description of each phase. In the initial search, a total of 677 records were found in the PUBMED database. Only one additional source article was identified (GOOGLE SCHOLAR). 11 records were eliminated due to being duplicates. Of the 678 articles, 596 were discarded. The rest were included in the search because their title contained the variable masks and/or at least one other keyword, or they were omitted because they did not fit the objective of this review. The remaining 82 were searched in full text for examination. After the evaluation with the inclusion and exclusion criteria, 33 were discarded because they did not address the impact of the use of the mask or were focused on its quality. Despite the filter, there were articles on: ophthalmic practices, updating protective equipment in hospitals, modification of masks, how to reuse them, their rational use to avoid shortages, and their production. These were purged.

The 49 articles included in the final review correspond to 43 quantitative works (87.8%), 4 systematic reviews (8.1%) and two qualitative (4.1%). Regarding journals with the largest number, the International Journal of Environmental Research and Public Health has 4 (8.2%), Annals of Internal Medicine: 3 (6.1%), The European Respiratory Journal: 2 (4%), The Journal of Infection: 2 (4%), PloS One: 2 (4%), Travel Medicine and Infectious Diseases: 2 (4%) and the rest have only one publication. Regarding the month, October has 10 (20.4%), August 9 (18.4), September 9 (18.4%), November 8 (16.3%), June 5 (10.2%), July 4 (8.2%), May 2 (4%), April has one (2%) and March another (2%). For a better understanding of the results, the findings were grouped into three themes: the introduction of face masks to reduce the risk of COVID-19, inappropriate use as a risk factor, and other impacts.

The introduction of face masks to reduce the risk of COVID-19

In April 2020, there was a debate around the world regarding the use of medical masks or N95 respirators in the community [2]. Distancing, wearing face masks and eye protection, were known to protect against respiratory diseases transmitted through droplets.

In May, a cohort study was published in Beijing on reducing transmission of SARS-CoV-2 in households through the use of masks, disinfection and social distancing [3]. confirming the risk before the onset of symptoms. It was the first evidence of the effectiveness of masks to prevent COVID-19.

In June the universal use of face masks had implications for prevention policies [4]. The cloth mask was even supported as an economic alternative in the community. A cross-sectional study on the use of protective equipment against coronavirus by health professionals in Wuhan, China [5]. pointed out that before having a safe and effective vaccine, health systems should prioritize the acquisition and distribution of personal protective equipment. An article on the role of face masks in the community to control the epidemic was published in July [6]. which suggested that it could contribute to the control of COVID-19 by reducing the amount of emission of infected saliva and respiratory droplets from asymptomatic or mildly ill people.

In August, studies pointed to the use of masks in pre-symptomatic patients to prevent the transmission of SARS-CoV-2. Other epidemiological analysis [7]. showed findings on mitigation by restricting mass gatherings in congested spaces. A first systematic review on the efficacy of the mask in preventing the transmission of the virus [8]. added evidence of its protective value as a complementary method. The use of cloth face masks to prevent COVID-19 was considered a moderately effective measure for the spread of respiratory infections caused by particles the same size or smaller than those of SARS-CoV-2 [9]. The type of fabric used, the number of layers and the frequency of laundering were found to influence its effectiveness. A market study [10]. pointed out the effectiveness of face masks in conjunction with social distancing to flatten the contagion curve when resources were limited [11].

Another systematic review of the efficacy of masks and respirators [12]. suggested that its use by healthy people could be beneficial because the transmission of COVID-19 could be presymptomatic. The use of face masks by the community and in healthcare settings could prevent infections and deaths of healthcare workers, since aerosolization had been documented in the hospital setting. In this sense, the debate fell on whether or not to mask children [13]. since previous studies indicated that asymptomatic people could become important sources of contagion, which is frequent in pediatrics. Therefore, the universal use of face masks against COVID-19 began to seem necessary to get out of confinement.

In September a study on the effectiveness of masks and face coverings to control the emission of aerosol particles [14]. corroborated the efficacy of the medical mask and the importance of regular washing of the homemade mask [15]. along with isolation and regular hand hygiene.

Mass masking to contain COVID-19 [16]. it was already a guideline after the recommendations of the World Health Organization (WHO) of June 5, 2020 on the use of masks [17]. Governments were asked to encourage their introduction in specific situations and settings to suppress transmission. But health promotion strategies were required to use face masks.

In the study called "universal masking in hospitals in the COVID-19 era: is it time to consider shielding? [18]. it was indicated that hospitals faced a dilemma at a time of critical shortage of masks. A rapid systematic review [19]. Urged its use in conjunction with general protective measures. Another study noted that non-medical cloth masks could decrease transmission [20].

In October a study on the effectiveness of face masks [21]. showed that both cotton and surgical ones provided protection against droplet/aerosol transmission. Incluso reducían el inóculo [22]. In this way, public masking led to higher immunity and slower spread while the vaccine arrived. The effectiveness of cloth masks was reconsidered, suggesting that health workers not use them, reserving them for the community [23]. N95 respirators better reduced the risk of SARS-CoV-2 compared to surgical masks in healthcare [24].

In November, a debate was circulating around the lack of confinement to avoid the severity of a second wave: could masks stop the resurgence of COVID-19? [25].

At the end of 2020 the use of masks was essential in public spaces where social distancing could not be applied [26]. The community in general should use them. [27]. For this, governments had to establish strategies to guarantee a sufficient supply and reduce inequities in health resources.

The inappropriate use of face masks as a risk factor for COVID-19

In March 2020, during the COVID-19 outbreak, there was already a medical mask crisis [28]. Although the origin of SARS-CoV-2 was in China, evidence suggested person-to-person transmission, which meant the possibility of spread to any part of the world. Problems related to shortage of face masks deserved global attention.

One of the first guidelines for mitigating the pandemic around the world was the correct use of face masks in the community [29]. In June, a Lancet study on physical distancing, face masks, and eye protection to prevent transmission produced its first systematic review and meta-analysis on it [30]. The findings of that review supported the emphasis on physical distancing over mass mask use. A review of the usefulness of masks during the COVID-19 pandemic [31]. pointed out the possibility that by themselves they would not delay it unless combined with social distancing, hand hygiene and other preventive measures, which were already proven. The massive use of masks was related to a false sense of security.

In July a study on the risk of transmission of SARS-CoV-2 by aerosols, rational use of masks and protection of health workers against COVID-19 [32]. showed that no mask completely prevented transmission due to improper handling and alternative routes of transmission. Therefore, adherence to a set of infection control measures and thorough hygiene remained key. It was essential to educate intensively on the use of face masks [33]. In September 2020 another study in Japan [34]. Demonstrated that many citizens implement inaccurate measures. In October a survey on the use of personal protective equipment and COVID-19 tests in pregnant women, also in Japan [35]. evidenced the scarcity of personal protective equipment (PPE) in an alarming way. It was necessary to avoid unnecessary interruptions in medical care. In parallel, an association among construction workers at risk of COVID-19 infection and hospitalization in Texas [36]. determined that unrestricted work in high-touch industries has a higher level of community transmission.

In Nigeria, the importance of maternal perception on the use of masks in children as a preventive strategy was demonstrated [37]. which was reinforced by the educational level of the mother, employment and marital status.

The use of masks by health workers during the lockdown by COVID-19 in Europe questioned: what was the public observing through the French media? [38]. Ineffective behaviors were described when the general population began to use protective equipment dedicated to health personnel. Individuals base their behavior on what they see in the media and emphasis should have been placed on health promotion and community education. It

was also pointed out: why was the N95 mask not the standard? [39]. Existing data were inconclusive regarding its effectiveness in the community compared to other.

Other impacts of the introduction of the face mask against COVID-19

A study published in May on a mask-induced dermatosis during the COVID-19 pandemic [40]. associated its introduction and frequent use with the development of itching. N95 respirators were associated with more skin reactions than other medical masks [41].

In mid-2020, due to the shortage of face masks, an application survey was carried out in Taiwan [42]. It was shown that the population knew where to buy masks thanks to real-time data. This situation is part of the unexpected effects of the pandemic: Internet information alleviates panic. A social media analysis of mask-related tweets during the pandemic [43]. noted that in 2020 one of the most common topics and popular hashtags encouraged using them. Hacia junio de 2020 el público utilizaba Twitter para hacerlo.

Another impact of mask use, hand hygiene, and social distancing, reported by a retrospective epidemiological surveillance study conducted in China in August, showed a significant decrease in cases of influenza, enterovirus, and all-cause pneumonia during the pandemic [44].

In September a study on the social consequences of mask policies during the pandemic in Germany [45]. evidenced that voluntary participation would likely lead to non-compliance, as public measures are often perceived as unfair. Por lo tanto, una política obligatoria es más eficaz para frenar la transmisión del virus.

The psychological impact of wearing masks [46]. suggests important consequences in basic needs of autonomy and affinity. This contributed to the controversy associated with the face mask.

In October, a descriptive study among nursing staff on the use of protection during the pandemic [47]. Noted that physical problems related to personal protective equipment (PPE) are common and increase when worn for more than 4 hours.

Another consequence of the massive use of face masks in 2020 will be reflected in nature. In an article called Covid-19 Face Masks: A Potential Source of Microplastic Fibers [48]. awareness is raised about the prevention of COVID-19 and protection of the environment through the reduction, elimination and proper handling of disposable masks. Plastic pollution may be the next global pandemic. Surgical masks as a potential source of contamination [49]. it is an important issue. The masks are ingested by fish and microorganisms of aquatic life, affecting the food chain with effects on human health. The microplastic in the mask should be a focus of attention around the world.

The relationship between participation in leisure activities and the use of face masks with a positive attitude [50]. it is also important to allow people to maintain control of their own health.

Finally, there is a rejection of the massive implementation of face masks by various groups around the world [51]. For this, social communication must combine strategies, which is a challenge among public health authorities.

## Discussion

At the beginning of the COVID-19 pandemic, there were two positions regarding the use of face masks. Some enacted their massive introduction to reduce the risk of the disease and others considered the inappropriate use of masks as a risk factor. The objective of this work was to compile and review the available scientific literature on the impact of the introduction of masks against COVID-19. A methodical search for evidence was carried out in

reliable sources for its description, including 49 articles published from March to November 2020.

Regarding the limitations of this review, it is likely that good quality articles have been omitted due to the nature of the subject, since the information is dynamic and is continuously updated.

## Conclusions

The impact of the face mask is absolute. In 2020 it became the norm. It is suggested that it reduced COVID-19 when it was used massively, avoiding the contagion of patients while the vaccine arrived. Wearing masks is a commendable measure to protect yourself and prevent the spread of any virus. It is important to use them correctly and consider the consequences that plastic materials will cause in the environment. Within the framework of interventions to improve public health, protective measures against COVID-19 must continue.

## Declaration

The author declares that he is independent with respect to funding and support institutions. During the execution of the work or the drafting of the manuscript, no interests or values other than research have affected. He has no conflict of interest.

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