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To Mask or Not To Mask? A Review of Literature

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Abstract

During the COVID-19 pandemic, face masks—such as surgical masks and cloth masks—were used as public and personal health measures to control the spread of the SARS-CoV-2 virus. Mask use is recommended as an additional preventive measure to help limit community transmission, especially since COVID-19 primarily spreads through respiratory droplets when an infected person coughs or sneezes. Recommendations for mask use have varied, and the World Health Organization (WHO) has revised its guidance since the beginning of the outbreak.

Mask-wearing is advised when COVID-19 infections and hospitalizations are rising in a community, when community immunity is low, or based on an individual's health status. The WHO generally recommends disposable medical masks, non-medical masks that meet safety and efficacy standards, or other well-fitting non-medical masks. To further reduce infection transmission, it is also important to practice hand hygiene and avoid close contact with sick individuals. Clear guidelines regarding the production, use, sanitization, and disposal of face masks can help improve compliance and bring communities closer to reducing the spread of COVID-19.

Key Words: CDC, COVID-19, Face mask, Review, WHO.

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1- INTRODUCTION

Knowledge about the transmission of the COVID-19 virus is expanding daily. COVID-19 is primarily a respiratory disease, with clinical manifestations ranging from very mild, non-respiratory symptoms to severe acute respiratory illness, followed by limb dysfunction and death (1–7). In some infected individuals, no symptoms have been reported (8, 9). Evidence indicates that COVID-19 is transmitted mainly through respiratory droplets and aerosols (1–9). Droplet transmission occurs when a person is in close contact (within one meter) of an infected individual and is exposed to potentially infectious respiratory droplets, for example, through coughing, sneezing, or very close personal contact, leading to contamination of the body's entry points such as the mouth, nose, or conjunctiva (1–7). Transmission may also occur via contact with contaminated surfaces in the immediate environment of the infected person (8, 9).

Thus, COVID-19 transmission can happen both directly through contact with an infected person and indirectly through contact with contaminated objects or surfaces (1–9). Some studies suggest that transmission can occur from asymptomatic individuals as well (10–15). Therefore, to prevent further spread of the virus, it is recommended that everyone wear masks in public, especially indoors—in places such as public transportation, shops, and any locations where non-household members are present. The use of masks by both infected and healthy individuals has sparked debate; some support mask-wearing, while others oppose it, each group offering justifications for their positions (16). This review aims to examine research and relevant scientific guidance on this topic to better address this challenge.

2- MATERIALS AND METHODS

2-1. Data sources

A narrative review approach was adopted to enable interdisciplinary synthesis and interpretation of evidence, which can deepen understanding of the subject matter. In this review, a systematic search was conducted across electronic databases including Medline (via PubMed), Scopus, Web of Science, ProQuest, Cochrane Library, SID, Magiran, CIVILICA, and Google Scholar, covering literature published up to October 2021.

The following keywords were used individually and in combination: "COVID-19," "Mask," "Face Mask," "Prevention," "Cons," "Pros," "Advantages," "Disadvantages," "Negatives," and "Positives." The search process was performed independently and in duplicate by two reviewers, with disagreements resolved by consultation with the supervisor. This robust search strategy aimed to ensure comprehensive coverage and minimize selection bias.

2-2. Study selection

The database search was conducted to identify relevant studies. Abstracts were screened to determine eligibility, followed by retrieval and assessment of full-text articles. A final list of eligible studies was then compiled. This process was performed independently and in duplicate by two reviewers, with any disagreements resolved by a third reviewer. References were organized and managed using EndNote software (version X8).

2-3. Ethical considerations

Approval from a research ethics committee was not required, as the study involved analysis of publicly available articles only. Ethical standards were upheld by respecting copyright laws and maintaining transparency in the methods and sources used.

3- RESULTS

Based on research articles, journals, and official guidelines from various countries, mask use is recommended for diseases transmitted via airborne droplets and respiratory routes. Recommendations vary depending on specific guidelines and regional contexts. However, routine mask use by the general public is not universally endorsed by organizations such as the WHO, CDC, or ECDC. The main characteristics of the selected studies are summarized below:

3-1. Evidence

Several randomized clinical trials have investigated the use of masks in both community and healthcare settings, employing various interventions. These interventions include mask use alone or in combination with other measures such as hand hygiene, yielding mixed results. Among nine clinical trials conducted in community settings, all but one focused on respiratory protection through mask use within communities. The findings suggest that the effectiveness of masks—whether used alone or alongside hand washing—may depend on early implementation and high adherence to infection control practices in the community (17–25). However, overall evidence supporting the effectiveness of mask use alone remains limited to moderate due to the heterogeneity of interventions.

The World Health Organization (WHO) recommends masks as part of a comprehensive prevention and control strategy to limit the spread of SARS-CoV-2, the virus that causes COVID-19 (26). Mask use alone, even when properly implemented, is insufficient to provide full protection or source control. Other infection prevention and control (IPC) measures include hand hygiene, maintaining a physical distance of at least one meter, avoiding touching the face, practicing respiratory etiquette, ensuring adequate indoor ventilation, testing, contact tracing, quarantine, and isolation. Together, these measures are essential to preventing human-to-human transmission of SARS-CoV-2. Proper use, storage, and cleaning or disposal of masks are also critical to maximizing their effectiveness and minimizing the risk of increased transmission (26, 27).

The WHO also issued the guideline “Guidelines for the Rational Use of Personal Protective Equipment against COVID-19” on February 27, 2020, stating that patients without respiratory symptoms do not need to use protective equipment while in triage units, counseling rooms, waiting areas, or public places such as shopping malls, bus stations, and subways (28). The CDC recommends mask use in areas with high transmission rates. It is also important to avoid crowded and poorly ventilated indoor spaces if there is an increased risk of severe illness from COVID-19, and to maintain a distance of at least six feet (1 foot = 0.304 m) from others, especially for individuals at high risk or those not up to date on their vaccinations (29).

Another study indicated that face mask use in public is viewed as a temporary measure for certain perceptive groups and not as a substitute for established precautionary procedures (30). There is an urgent need to explore alternatives with higher efficacy than face masks. For some individuals—such as those with chronic obstructive pulmonary disease (COPD), acute or chronic respiratory diseases, during outdoor exercise, older adults, those with underlying medical conditions, or those sensitive to hypercapnia—face shields and social distancing may be better substitutes. However, further clinical studies are necessary to confirm these findings (30).

A review of the benefits and burdens of wearing face masks in schools during the COVID-19 pandemic found that masks can help prevent the spread of SARS-CoV-

2, particularly because the virus can be transmitted by asymptomatic individuals (31). However, covering the lower half of the face reduces the ability to communicate, interpret, and mimic facial expressions. Positive emotions become less recognizable, while negative emotions may be amplified (31).

A qualitative study involving 31 participants from the German-speaking region of Switzerland in April 2020, with follow-up interviews of 25 participants in October 2020, explored individuals' values and perceptions regarding mask wearing in the absence of mask mandates during the pandemic. The results suggested that policymakers should recognize that face masks may conflict with Western cultural norms of social interactions. Specifically, face masks were seen as a symbol of social disruption inconsistent with Swiss culture. The impairment of social exchange—due to the difficulty in reading facial expressions—was viewed as a significant drawback. Consequently, face masks were perceived as acceptable only temporarily, highlighting the importance of enforcing mask mandates only when epidemiologically necessary in countries where mask wearing is not culturally ingrained (32).

A rapid review examining the association between children wearing masks and COVID-19 incidence found that mask use among children is linked to a reduced incidence of SARS-CoV-2 infections in schools. Studies have demonstrated lower transmission levels in settings where masks and other preventive measures were implemented (33).

A literature review provided evidence supporting widespread mask use to reduce community transmission, as nonmedical masks are made from materials that effectively block droplets of specific sizes. People are most infectious during the initial post-infection period, when symptoms are often mild or absent. Nonmedical masks have been shown to reduce the transmission of influenza and have demonstrated effectiveness in blocking coronavirus transmission in small trials. In locations and situations where mask usage is required or widespread, substantially lower community transmission rates have been observed. The evidence indicates that wearing masks reduces transmissibility per contact by limiting the spread of virus-laden droplets in both laboratory and clinical settings. Public mask-wearing is most effective at preventing viral spread when compliance is high. This reduction in transmissibility can significantly decrease mortality rates and economic burdens, while the cost of mask-wearing interventions remains low (34).

One study highlighted that most environments and contact situations are virus-limited—characterized by low virus abundance—where surgical masks are effective at preventing virus spread. More advanced masks and protective equipment are necessary in potentially virus-rich indoor environments, such as medical centers and hospitals (35). A review aimed at assessing the pros and cons of face masks in preventing the spread of SARS-CoV-2 and other pathogens indicated that face mask use in public has been considered a temporary measure by certain perceptive groups, rather than a replacement for established precautionary protocols. There is an urgent need to explore alternatives with greater efficacy than current face masks. For some individuals—due to conditions such as COPD, acute or chronic respiratory diseases, outdoor exercise, old age, underlying medical conditions, or sensitivity to hypercapnia—face shields and social distancing may serve as better alternatives to face masks. However, further clinical studies are needed to confirm these findings (36).

A review of the effectiveness and rational use of face masks showed that wearing a mask could reduce the distance traveled by respiratory droplets to half that of droplets expelled without a mask (37). A systematic review of 35 studies assessed the efficacy and effectiveness of mask use in community settings for reducing the spread of COVID-19 and similar diseases. While robust randomized controlled trials (RCTs) on face mask effectiveness are needed to inform evidence-based policies, this review and several observational studies within RCTs did not provide strong evidence of mask efficacy. It should be noted, however, that wide confidence intervals may have affected the statistical significance of the overall estimates (38).

Another review concluded that during epidemics, medical masks—and if unavailable, appropriate homemade masks—should be used universally when physical distancing is not possible. Combined with other infection prevention and control (IPC) measures, this strategy can enhance community protection and empower individuals (39).

A further review confirmed that wearing a mask could reduce the travel distance of respiratory droplets by half. It also advised against wearing surgical masks and gloves for extended periods (longer than a few hours) and emphasized proper and careful disposal to prevent cross-contamination (40). An opinion paper recommended that face mask use be implemented as widely as possible, ideally nationwide, and immediately, even if most masks are homemade and of relatively low quality. This intervention could significantly help control the COVID-19 pandemic, with its benefits maximized when combined with other non-pharmaceutical interventions such as physical distancing (41).

However, covering the lower half of the face may impair the ability to communicate, interpret, and mimic facial expressions during interactions (41). Lastly, a review including 12 primary studies found that medical face masks should be worn by both sick and healthy individuals to prevent the transmission of respiratory infections (42).

A review of the literature provided evidence supporting the widespread use of masks as source control to reduce community transmission. Nonmedical masks are made from materials that block droplets of specific sizes. People are most infectious during the initial post-infection period, when symptoms are often mild or absent. Nonmedical masks have been effective in reducing influenza transmission and have also shown effectiveness in blocking coronavirus transmission in small trials. In settings and times where mask use is required or widespread, substantially lower community transmission has been observed (43).

3-2. How Does a Face Mask Work?

- COVID-19 spreads mainly through close contact between people.
- Droplets generated by coughing and sneezing can carry the virus to others.
- Coughs can spray droplets at least six feet, while sneezes can travel as far as 27 feet. Droplets may also spread during talking or raising one’s voice.
- These droplets can land on the face, including the mouth, eyes, and nose.
- When an individual wears a mask, it helps prevent more of their droplets from spreading.
- Additionally, a mask provides an extra layer of protection by reducing exposure to droplets from other people (44, 45).

3-3. Types of Masks

- The CDC recommends wearing a high-quality mask to help protect against COVID-19, including variants such as Omicron (46, 47). Examples of

high-quality masks include N95 and KN95 masks, which are highly efficient at blocking droplets. Surgical masks also provide better protection than cloth masks.

- If high-quality masks are not available, a mask made of two or more layers of tightly woven fabric can be used. Additionally, layering a disposable mask under a cloth mask can increase effectiveness. The cloth mask should press the edges of the disposable mask snugly against the face.
- Wearing a high-quality mask is especially important for individuals who are immunocompromised or at high risk of severe illness from COVID-19.
- Face coverings made of thinner, loosely woven, or single-layer fabrics—such as certain types of masks, scarves, neck gaiters, or bandannas—are not recommended, as they are less effective at blocking droplets expelled when speaking, coughing, or sneezing. In cold weather, it is advisable to wear a mask under a scarf or neck gaiter for warmth.
- Masks that incorporate exhalation valves, mesh masks, or masks with openings, holes, visible gaps, or vents are not adequate face coverings, as they allow droplets to escape.
- Masks with nose wires are preferred, as they improve fit and help reduce gaps and leaks around the nose (46, 47).

3-4. How to Wear a Mask?

- Wash your hands before putting on the mask and after taking it off (48).
- The mask should fully cover the nose and mouth and fit snugly against the face without gaps (49). It should not be overly tight or restrictive and should feel comfortable to wear (see **Figure 1**).
- For children aged two years and older, use masks designed specifically for children to ensure a proper fit. Children younger than two years should not wear masks (50).
- If you wear glasses, choose a mask that fits closely over the nose or has a nose wire to help reduce fogging.
- Avoid touching the mask while wearing it. If you need to touch or adjust the mask frequently, it may not fit properly, and you should consider finding a better-fitting mask or making adjustments (48).
- Cloth masks must be washed after each use (49).
- If reusing an N95 or KN95 mask, store it in a paper bag. Do not wash N95 or KN95 masks between uses. Follow the manufacturer's instructions for when to replace the mask.
- Do not wear masks that are dirty, damp, or damaged (48–50).

Fig. 1: How NOT to wear a mask (48).

3-5. Tips for Wearing and Caring for Masks

- Wash your hands before putting on the mask. Avoid touching your eyes, nose, or mouth when putting on or taking off the mask. Hold the mask by the outer surface and ear loops or head straps as much as possible, and avoid touching the inside of the mask (51).
- A mask should fit well so that you don't need to adjust it or touch your face frequently. It should fit snugly to minimize gaps, ideally preventing unfiltered air from escaping (52).
- If the mask becomes dirty, wet, or difficult to breathe through, remove it and replace it with a clean one. Dispose of disposable masks properly. For reusable masks, wash them with regular laundry before wearing again (51).
- Before eating or drinking, wash your hands, then remove the mask using the ear loops or head straps and place it in a safe location. After eating or drinking, wash your hands before putting the mask back on (52).
- When storing your mask while not in use, fold it carefully so the inside does not touch other surfaces. Store it in a clean paper bag or another breathable container (51).

3-6. Reasonable Accommodations

- People with disabilities, behavioral needs, or other health, mental health, or developmental conditions may have difficulty wearing a mask or other face coverings safely.
- Individuals who have trouble breathing, are unconscious, or are unable to remove a mask without assistance should not wear a mask.
- Children younger than two years old should not wear a mask.
- Certain situations, such as swimming or other activities where a face covering may become soaked or submerged in water, can make mask use unsafe (53).

4- DISCUSSION

This study aimed to review research on mask use and evaluate its advantages and disadvantages by analyzing relevant articles, journals, and official guidelines. The results showed that while mask use is recommended for diseases transmitted through airborne droplets and respiration, the regular use of masks in the community is not universally endorsed by organizations such as the WHO, CDC, or ECDC.

Masks serve as one of the protective measures against infection and help prevent the transmission of coronavirus within the community. They are especially important for individuals with medical conditions or those taking medications that weaken their immune system, as these people may not be fully protected against COVID-19 even if they are up to date with vaccinations (1, 26, 28). The novel coronavirus (COVID-19) spreads through droplets projected into the air when an infected person speaks, coughs, or sneezes. The risk of transmission via droplets increases when people are in close proximity to one another (3, 38, 39). A study conducted in Hong Kong showed that the transmission rate of the novel coronavirus through respiratory droplets or airborne particles was reduced by 75% when medical masks were used (54).

The results of another study showed that when medical masks are used properly, the possibility of spreading the virus from the respiratory tract is reduced by 100%. Additionally, if 80% of people wear masks in public places, it may eliminate virus transmission altogether (55). Evidence suggests that with 80% public mask usage, COVID-19 transmission could be halted

(56). Another study reported that unfitted surgical masks were 100% effective in blocking seasonal coronavirus present in droplets expelled during breathing (57).

Credible guidelines and numerous studies recommend wearing a respirator in certain situations or when individuals require or desire greater protection. These scenarios include:

- When caring for someone who is sick with COVID-19;
- If the person is at increased risk for severe illness, such as the immunocompromised, older adults, and individuals with underlying medical conditions;
- When working in jobs involving interaction with large numbers of people, especially when mask use is inconsistent, such as bus drivers and grocery store workers;
- When traveling on planes, buses, trains, or other forms of public transportation, particularly for extended periods and where social distancing is not possible;
- When physical distancing cannot be maintained, or when in crowded indoor or outdoor public settings; or
- If one is not up to date with COVID-19 vaccinations (1, 6, 26, 44–51).

It should be noted that masks do not replace social distancing measures or vaccination. People should continue to employ all possible methods to prevent coronavirus infection, including avoiding close contact with others, washing hands frequently, and ensuring regular air circulation in homes and public spaces such as schools, banks, and offices—ideally by keeping windows open. It is also essential for health authorities to provide clear guidelines on the production, use, sanitization, and reuse of face masks, as well as to facilitate their distribution as shortages allow. Clear and practical guidelines can help increase compliance and bring communities closer to the goal of reducing and ultimately stopping the spread of COVID-19 (58, 59).

5- CONCLUSION

Scientific findings indicate that wearing a mask properly is effective in reducing the spread of COVID-19. Reputable health organizations, such as the WHO and CDC, recommend mask use in crowded environments (such as public transportation) and for high-risk individuals, including the elderly, pregnant women, and those with underlying health conditions. The best way to protect against COVID-19 and its variants is to stay up to date with vaccinations by completing the primary series and receiving booster doses when eligible, as recommended by the CDC.

While COVID-19 continues to circulate actively, wearing a mask maximizes protection and helps prevent transmission, especially for individuals who are not fully up to date with their vaccinations. People should also adhere to local mask mandates and continue following other standard COVID-19 safety measures whenever possible. These include maintaining at least six feet of distance from others, avoiding touching the face, and frequently washing or sanitizing hands. By effectively combining these practices, individuals can significantly reduce their risk of infection while contributing to community safety.

6- CONFLICT OF INTEREST: None.

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