

# THE EVALUATION ON THE EFFECTIVENESS OF PROTECTIVE MASKS AGAINST RESPIRATORY INFECTIONS

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*ABSTRACT: This study aimed to evaluate the effectiveness of protective masks against respiratory infections, with a specific focus on the COVID-19 pandemic. A survey was conducted among a sample of individuals to collect their perceptions and attitudes towards wearing protective masks, including the frequency of use, type of mask used, and reasons for use or non-use. The survey also explored the impact of wearing masks on daily life, as well as sources of information and trustworthiness of such information. The study identified several factors that affect mask usage, including age, gender, and occupation. These findings have important implications for public health policies and education programs aimed at promoting the use of protective masks.*

*KEYWORDS: protective masks, respiratory infections, efficacy, evaluation, physical distancing, COVID-19.*

## 1. Introduction

The paper on "*Evaluation of the effectiveness of protective masks against respiratory infections*" focuses on assessing the effectiveness of different types of protective masks, including N95 masks, surgical masks and masks made of cotton or other materials, in preventing the spread of respiratory infections, especially in the case of the COVID-19 pandemic.

This study aims to assess how effective protective masks are in preventing respiratory infections. It proposes to us to determine whether the use of protective masks can reduce the spread of respiratory infections and to offer recommendations for improving their use in order to prevent respiratory infections.

The study was conducted in the context of the COVID-19 pandemic, which began at the end of 2019 and was declared a pandemic by the World Health Organization in March 2020. The pandemic has generated a global health crisis and put pressure on the health system and suppliers of protective equipment, including protective masks. Since the SARS-CoV-2 virus spreads through respiratory droplets, including the expiration, coughing and sneezing of infected people, the use of appropriate protective masks can help prevent the spread of infection. In this context, assessing the effectiveness of protective masks against respiratory infections, including COVID-19, is a topic of great importance for public health and for the protection of vulnerable people. [3]

Linking this theme is motivated by the special importance of protective masks in the prevention and control of respiratory infections, especially in the context of the COVID-19 pandemic.

Firstly, the COVID-19 pandemic has highlighted the importance of using protective masks against respiratory infections and highlighted the need to assess their effectiveness. Therefore, it is important to understand how different types of protective masks work, how effective they are and to what extent they can help prevent the spread of respiratory infections. [1]

Secondly, this study can contribute to the development and improvement of techniques for the prevention of respiratory infections and to improve safety in areas such as the medical system and the food industry. [1]

The objectives of this research are:

- To identify the frequency and type of protective masks used by participants.
- To evaluate the perceptions and attitudes of participants towards wearing a protective mask, including the reasons why they wear it or not wear it.
- To look at the impact of wearing a protective mask on the daily lives of participants.
- To provide recommendations and suggestions for the development of public health policies and education programs to promote the effective use of protective masks in the prevention of respiratory infections. [2]

The study's hypotheses are:

- Surgical protective masks are more effective in preventing respiratory infections than protective masks made of cotton or other textiles.
- The use of protective masks reduces the spread of respiratory infections in communities or crowded environments.
- People who wear protective masks are less likely to contract respiratory infections than those who do not wear masks.
- Protective masks may be more effective in preventing respiratory infections in certain situations (in environments with polluted or crowded air) than in others.

## 2. Current status

In recent years, respiratory infections have become a major public health problem worldwide, and the COVID-19 pandemic has highlighted the importance of measures to prevent and control these infections. There are some studies that suggest that protective masks are effective in preventing the spread of respiratory infections, including COVID-19, but their effectiveness is controversial.

Respiratory infections are caused by various pathogens - viruses, bacteria and fungi, which infect the airways of the body. They can affect the nose, throat, sinuses, ears, trachea, bronchi and lungs. The most common symptoms are cough, nasal discharge, pain, fever, headache and fatigue. [8]

Protective masks are one of the most important means of preventing and limiting the spread of the COVID-19 virus. This virus is transmitted through contact with viral particles expelled from the nose and mouth when an infected person speaks, coughs or sneezes. Protective masks help limit the spread of these particles by filtering the air you breathe. Protective masks used in connection with COVID-19 include N95 masks, surgical masks and textile masks. It is important to note that protective masks are not completely effective and should be used in conjunction with other precautions - physical distancing, hand hygiene and avoiding crowding. [7]

This study consists of evaluating the N95 masks, the surgical masks, the cotton masks and other materials. We will present the characteristics regarding these types of masks used against respiratory infections:

N95 masks are respiratory protective masks that have the ability to filter at least 95% of non-oily aerial particles, including very fine particles - those from viruses and bacteria. These masks are also called N95 particle filter masks. [4]

They are considered of high quality and are commonly used by medical workers and those who work in environments with dust and other particles. N95 masks are subject to strict standards and regulations to ensure they provide adequate protection against respiratory infections. [4]

These masks are created with an external layer of non-oily material, which protects against larger particles - those made of dust and pollen, as well as with an internal electrostatic filtration layer, which captures finer particles - those from viruses and bacteria. They are designed to fit tightly on the face so that particles can't enter the body through the edges of the mask. [4]

N95 masks are also available with a valve, which facilitates breathing. However, the use of these masks with a valve is limited in certain environments - medical ones, since the valve can allow particles to be expelled into the environment, which can pose a risk to other people. [4]

Surgical masks are medical devices that are designed to protect patients and doctors from bacterial and viral contamination. They are used especially in health facilities, but they can also be worn by people who want to prevent respiratory infections - flu or colds. [5]

Surgical masks are made of non-woven materials - polypropylene, which are able to filter out particles of small size. They are usually white or blue and are available in different sizes and shapes, to suit different faces. [5]

Surgical masks are classified according to their particle filtration efficiency. There are three main types of surgical masks: type I, type II and type IIR. Type I surgical masks are the least effective and can filter at most 95% of particles of small size - those of bacteria. Type II surgical masks are more effective, being able to filter at least 98% of small particles. IIR surgical masks are the most effective, being able to filter at least 98% of small particles and are resistant to liquid splashes. [5]

Surgical masks are designed to be worn only once and then discarded. They must be used carefully to prevent contamination, and people who use them must strictly follow the instructions for use and disposal. [5]

Masks made of cotton or other textiles are generally used in order to reduce the risk of spreading respiratory infections. They are often used in non-medical environments, such as in communities or where high protection against particles or bacteria is not required. Masks made of cotton or other textiles are made of multiple layers of fabric and can be equipped with filters. They are reusable and can be washed, which makes them more affordable and environmentally friendly than other types of masks. [6]

However, cotton or other textile masks do not offer the same protection as N95 or surgical masks. They cannot be considered an alternative to them in environments at high risk of exposure to particles or bacteria. Also, if they are not manufactured and used correctly, these masks can increase the risk of infection. It is important to follow the guidelines and recommendations of health authorities on the proper use and cleaning of masks made of cotton or other textiles. [6]

The correct use of protective masks is essential to reduce the spread of respiratory infections, including COVID-19. It is important to understand the differences between the types of masks and to use the appropriate masks for each situation. In general, surgical masks are recommended to prevent the spread of viruses and bacteria, while N95 masks are recommended for personal protection from very fine particles - those from combustion fumes or toxic materials. It is important to follow the guidelines and instructions of public health authorities on the use, disinfection and disposal of protective masks to prevent the spread of infections. It is also important to understand that the use of protective masks is not sufficient in itself to prevent the spread of respiratory infections, and that a combination of personal hygiene measures is required - regular hand washing and physical distancing.[9]



Fig. 1 Correct use of protective masks

### 3. Research methodology

To investigate the effectiveness of protective masks against respiratory infections in the context of the COVID-19 pandemic, we will use the following methodology:

- Selection of the sample:

Probabilistic sampling is used to ensure the representativeness and validity of the data. The sample consists of 100 randomly chosen people of different ages, targeting people who wear protective masks in

various situations - medical employees, employees in industries, people who use public transportation, pupils / students, both in urban and rural areas. An appropriate sample size shall be determined in order to obtain significant and representative results.

- Data collection:

As a research method, we used a survey method that is based on a questionnaire. The questionnaire was submitted online and included questions about the habits of wearing masks and experiences regarding their use in different situations.

Link to questionnaire: <https://forms.gle/YTX4Dq4WZ79BATLz9>

- Data analysis:

The data collected was analyzed using appropriate statistical methods, including univariate and bivariate analysis. Statistical inference tests have been used to determine if there are any significant differences between groups of people for the relevant variables.

- Interpretation and presentation of the results:

The results include an analysis of the similarities and differences between the groups of people and the goals of the study. The implications of these findings in the context of respiratory infections in the context of the COVID-19 pandemic are discussed. Recommendations are being made for future public policy actions and the respiratory infections we face.

### 3. Results

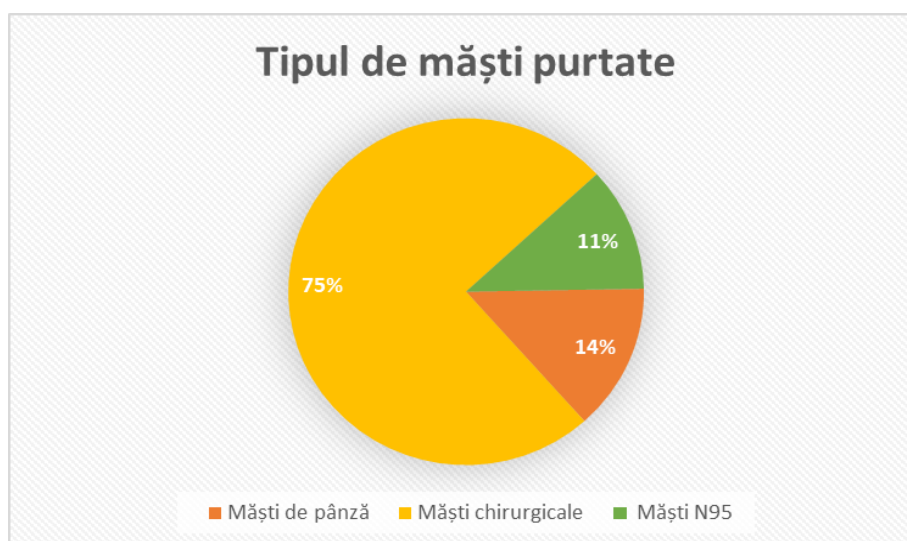


Fig.2 Type of masks used by participants against COVID-19 Infection

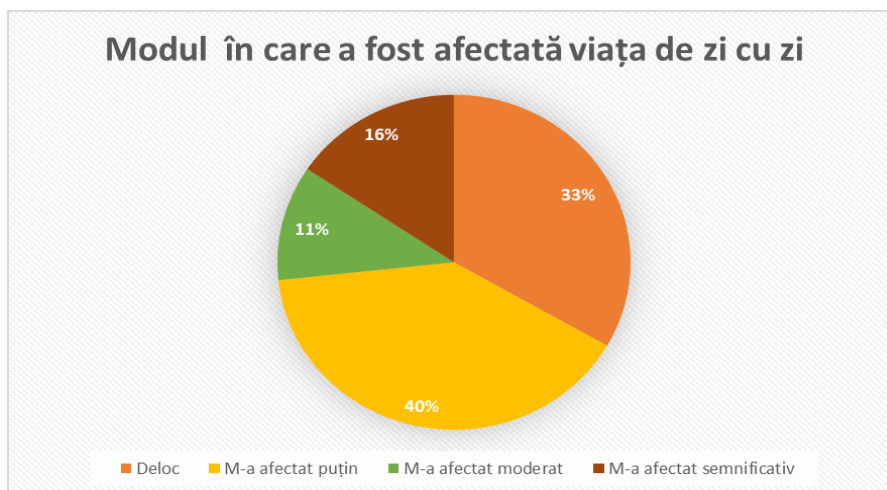


Fig.3 How it affected the daily lives of the participants regarding the wearing of protective masks

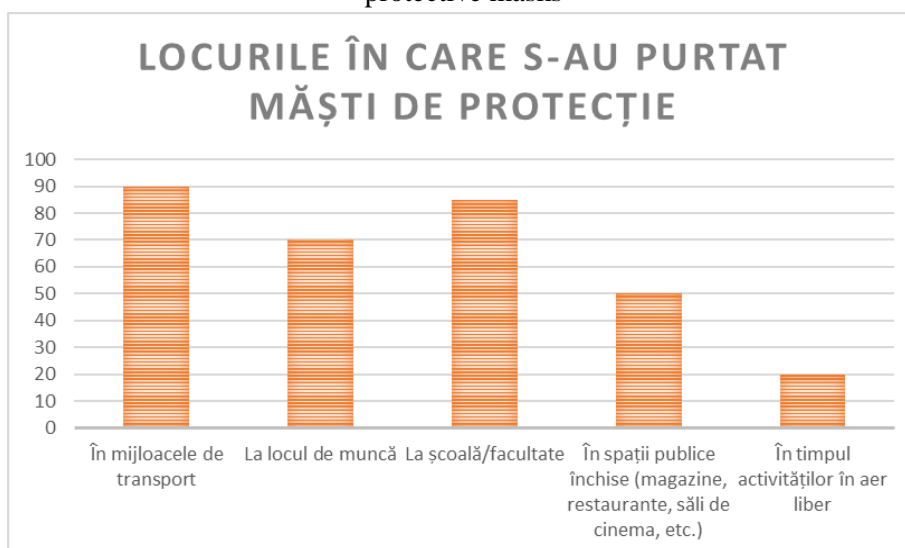


Fig.4 The most common places where participants wore protective masks

Our study showed that surgical masks were the most used (Fig.2), and people reported that wearing them did not significantly affect everyday life (Fig.3). However, wearing masks can be uncomfortable or disturbing for some people - those with respiratory problems or those who wear glasses. There are also concerns about the social and emotional impact of wearing masks - the difficulty of nonverbal communicating and the feeling of isolation. Generally, people are willing and wear masks to protect their own health and those around them. Masks have been worn in several places, especially in closed spaces, crowded or at high risk of infection. These include public transport, schools, workplaces, shopping centers, cinemas, and other public places where it is difficult to maintain physical distance (Fig.4).

#### 4. Conclusions and recommendations

From the results of our study, we can conclude that N95 masks are the most effective in preventing respiratory infections, followed by surgical masks. Cotton or other textile tiles are less effective, but they can be useful as additional protective measures in certain situations. It is important to pay adequate attention to training and education on the correct use of protective masks, as well as to consider other preventive measures - social distancing and proper hand hygiene. These conclusions have significant implications for public policies and for the management of respiratory infections in the context of the COVID-19 pandemic.

Recommendations:

- It is important to use quality protective masks that cover the nose and mouth and are comfortable to wear in order to avoid frequent adjustments;
- Change masks regularly and wash them after each use, especially those made of textiles;
- In addition to wearing protective masks, it is important to observe the other hygiene measures - regular washing of hands and maintaining social distance;
- To avoid the risk of infection, it is recommended to avoid close contact with people who have symptoms of respiratory infection or who have been exposed to the virus;
- In case you show symptoms of respiratory infection, it is important to stay at home and seek immediate medical attention;
- In general, protective masks should be used as an additional protective measure, and the decision to use them must be taken in the specific context of the situation and in accordance with the recommendations of local health authorities.

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