

# Low Cost Mask (Niqab) to Prevent COVID19 Spread in Muslim Countries

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## Abstract

The study aimed to determine the low-cost measurement of facemask efficacy especially the Niqab against the spread of COVID-19 during the speech. It is evident from the data provided by UN Women that the countries with a Muslim majority where covering the face with Niqab is culture has a less percentage of women affected by the COVID-19 virus as compared to the countries where women do not cover their face with niqab. conclusion: people are looking for low-cost measures for prevention against the spread of Covid-19. A niqab is made up of different types of cloth and works in a similar way to a cloth mask.

**Keywords:** COVID-19, facemask, niqab, Muslim women

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## INTRODUCTION

After the outbreak of Spanish Flu in 1918 and 1919, the biggest challenge for public health is no doubt the spread of novel coronavirus which is also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) or COVID-19 (1). The emergency state has been declared by many nations including but not limited to the USA, Spain, China, and Portugal after the rapid rise in the spread of SARS-CoV-2 (2-4). It has been reported by Johns Hopkins University that till 28 March 2020, around 660,706 people had been infected by the virus and nearly 30,862 people were killed by the virus around the world (5). The condition not only was overwhelming in Italy where hospitals were unable to cater to the patient need but also halted the global economy (6,7). Additionally, COVID-19 also caused havoc in the financial world and resulted in the worst trading day since 1987 in which S&P was 500 (- 9.5%) and FTSE was 100 (- 10.9%) (8).

On 31<sup>st</sup> December 2019 (9), the first case of COVID-19 was reported in Wuhan, China. It has been reported that patients who were initially exposed to the virus visited the local Huanan South China seafood market where a large variety of wild animals are sold. This suggests that the barrier between the animal and humans was crossed by the zoonotic Coronavirus at this wet market (10-12). Till 15 August 2020, there are 21,213,649 cases of COVID-19 that have been reported with 760,421 deaths globally (13). Since the emergence of COVID 19, wearing facemask has been made compulsory to prevent the spread of infection. WHO has issued a guideline on 19<sup>th</sup> March 2020 for the prevention of the spread of COVID-19 infection. WHO has advised the use of masks along with other precautions for healthcare workers as well as the general public (14).

## Face masks are required in public spaces.

If you are contaminated and do not know it, a mask helps safeguard those around you. Via droplets formed when you breathe, speak, or clear your throat, people without any symptoms can be able to spread the virus. One more precaution we should take to help delay the spread of COVID-19 is a face mask, though it is not a replacement for physical distancing and other preventive steps.

Examples of when you need a face mask:

Trips to any shop, drugstore, doctor, or hospital, At a meeting with friends and relatives who are not staying in your household in the park, At any public indoor or outdoor gathering, such as a rally, protest, market for farmers, or campaign, **The cases:** Riding buses, taxis, or sharing rides, Driving on a crowded and noisy street, A yoga or fitness lesson before and after

Examples of when or when a face mask is not required:

Going for a walk in the woods or in your city  
Do strenuous exercises or sports, such as biking, cycling or yoga lessons.

• Infants under 2 years of age

Anyone who has difficulty breathing

Anyone who is unable to remove it without help

Anyone with a medical or cognitive excuse for not wearing a mask.

If you have or have trouble breathing with a medical or developmental disorder, you do not have to Display proof of your illness, or evidence.

In private spaces and surroundings, what about wearing a mask?

We suggest that people wear masks when they are with people in a private setting or room.

Who live outside their homes and cannot remain 6 feet away from each other? For instance, at a gathering

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Now, facemask has to be worn in every place including family gathering and at places and in situations where expression of emotions is an important component of communication. It is now being hacked as a fashion item. Such a major revolution all over the world negates the commonest argument raised by the anti-Hijab community that wearing a hijab is the barrier to communication and limits expressions of emotions required on many occasions. Following these guidelines, countries around the world are taking measures to prevent the spread of COVID-19 infection which includes but not limited to social distancing, complete lockdowns, provision of facemasks, and sanitizers (15,16).

It is a common tradition in Islamic countries to wear a veil, known as "niqab" such as in Saudi Arabia. A woman's modesty and her moral character is one of the greatest commandments of the religion of Islam. There is no doubt that the veil is regarded as preservation and concealment for women, and it is evidence of the purity of the heart and compliance with the commands of God Almighty. The veil or niqab consists of two or three layers of cloth pieces (17). In 2013, a report was published by The New England Journal of Medicine on the outbreak of Saudi-hospital Middle East respiratory syndrome (MERS). MERS was caused by MERS coronavirus and resulted in 659 deaths. Infected cases of MERS were the majority of men. Women affected by MERS were less in number. This may be due to the wearing of niqab by Arab women (18). Keeping this in view, the purpose of this review article is to establish that does niqab, a low-cost measure, play any role in reducing the spread of COVID-19.

### Transmission of COVID-19 Virus

According to WHO (19), contact transmission and droplets (>5-10  $\mu\text{m}$  in diameter) are the main routes of transmission for the COVID-19 virus. However, it has been established by a study that was carried out in China on 75,465 COVID-19 cases, there was no airborne transmission of the virus (20). When a person having respiratory symptoms such as sneezing or coughing comes in contact with another person i.e. within 1 meter then the droplet transmission occurs. Therefore, the second person is at risk of getting his conjunctiva (eyes) or mucosa (mouth and nose) getting infected. There are also chances that the immediate environment around the infected person may have fomites which may also become a cause of transmission (21). Therefore, the transmission of the virus can occur either by direct contact of an infected person or by indirect contact of an infected person through its immediate environment or objects (19).

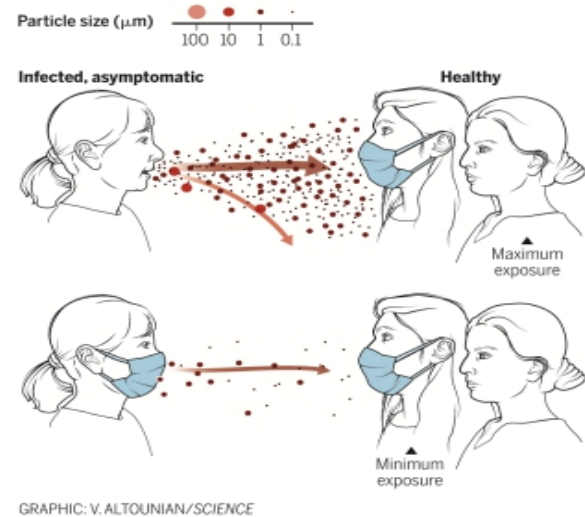
As for the Airborne transmission, there should be a microbial presence in droplet nuclei (<5 $\mu\text{m}$  in diameter), therefore these droplet nuclei can remain airborne for longer periods and can be transmitted over areas more than 1 meter. Specific settings and circumstances are required for airborne transmission of the COVID-19 virus (19). Luo et al. (22) confirmed that 7 people got infected when a confirmed case of the COVID-19 took a 2 hours bus ride wide them without any contact. This implies that there is a possibility that COVID-19 can transmit through airborne droplets. For a period of three hours, the COVID-19 virus can remain viable when in aerosols. COVID-19 virus is most stable on plastic for 72 hours, then 48 hours on stainless steel, 4 hours on copper whereas 24 hours on cardboard surfaces (23).

The method of infection can get altered by the size of the droplet. It is easier for large droplets of diameter greater

than 20 micrometers to fall on surfaces due to gravity as compared to small droplets having a diameter between 5 to 10 micrometer that will evaporate before falling to the surface and becoming airborne (24). It has been reported that with strong sneeze or cough, droplets of diameter 1 micrometer could remain airborne for more than 12 hours and could reach a distance of over 20 feet (25). It has been reported that when the subjects positive for COVID-19 were not using any type of mask to cover the face, the percentage for droplets was 30% and 40% for respiratory and aerosol droplets respectively. However, when the same individuals were tested again after wearing the mask, no COVID-19 virus was detected in the droplets or the aerosols (26). The study indicates that the spread of COVID-19 can be prevented by wearing face masks.

### Masks reduce airborne transmission

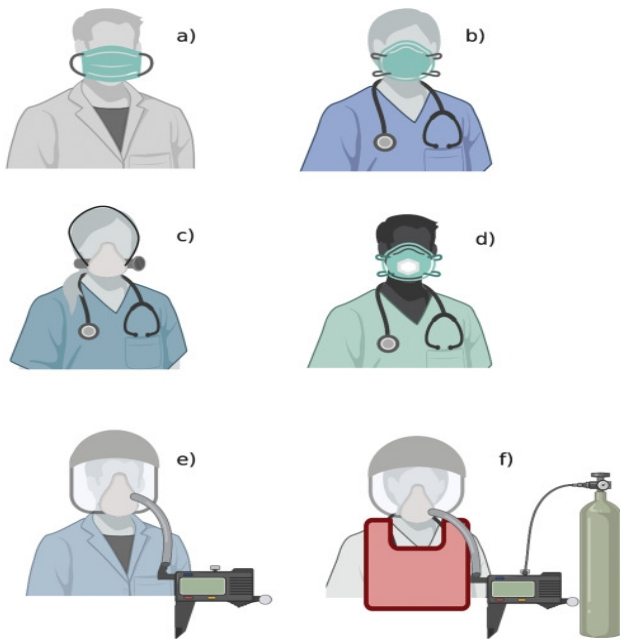
Infectious aerosol particles can be released during breathing and speaking by asymptomatic infected individuals. No masking maximizes exposure, whereas universal masking results in the least exposure.



**Figure 1.** Reduction of COVID-19 transmission through masks (25)

### Methods to Prevent Transmission of COVID-19

To break the link of transmission of the COVID-19 virus, wearing masks in daily routine is the main intervention in public health. There are two main groups of masks i.e. medical masks and respirators. An immediate barrier is provided by surgical/medical masks between the surrounding environment and the respiratory organs. Two factors determine the effectiveness of the facemask or a respirator, i.e. the fit of the mask on the face and the filtration efficacy (27). The specific range of particle size that a mask filter is the filtration efficacy. This range includes viruses and submicron particles. On the other hand, the leakage that is prevented by the mask or respirator around the facepiece is known as the fit. Medical masks can be categorized into three classes based on the filtration efficacy and the standards of FDA (28) and based on the efficacy due to fluid resistance, it is divided into ATSM levels 1, 2, and 3 (29). The bacterial filtration efficacy of the highest rank is given by level 3 along with high resistance against body fluids penetration (30).



**Figure 2.** Different types of masks. a) medical mask; b) filtering facepiece respirator; c) elastomeric respirator; d) filtering facepiece respirator with expiratory valve; e) powered and supplied air respirator; f) atmosphere-supplying respirator (31).

However, in comparison to the respirator, the efficacy of surgical/medical masks is less. Air purifiers or tight-fitting protective devices are present in the respirator that stop the passage of very small particles i.e. less than 5 micrometers, through the respiratory tract of a person. To achieve this purpose, either an independent air source is provided or contaminants are removed. Respirators have different names in different countries. The filtration efficacy of these respirators is determined by the National Institute for Occupational Safety and Health (NIOSH) in the USA. According to NIOSH, respirators are classified into three series i.e. into N-, R-, and P- series for not oil resistant, somewhat oil-resistant and strongly resistant, respectively and their filtration efficacies are respectively

95, 99 and 99.97%, hence named N95, R95, P95, etc. (42 CFR Part 84) (32). Even so, an expanding and real problem that is phased during the days of the pandemic is the shortage of medical/surgical masks or respirators or a hike in the prices of the same. Therefore, the use of alternatives like cloth masks which are also the low cost is increasing (33).

#### Efficacy of the Cloth Masks

Isolated virions are not stopped by cloth. However, large particles in the secretions when a person is eating, speaking, sneezing, or coughing, are generated which transmit most of the virus. These large particles could be aerosol (<5  $\mu\text{m}$ ) or droplets (>5  $\mu\text{m}$ ). The penetration of some particles is not the point but in the outward direction particularly, some particles can be stopped. Every particle that contains the virus, which is retained by the mask, is therefore not available as an aerosol to be scattered in the air or otherwise falls on a surface which is later picked by someone else upon touching that surface (34). It has been observed that aerosols and droplets have been blocked by the cloth and efficiency can be increased by adding layers. An experiment was carried out in which the filtration efficacy of different types of cotton cloth with a single layer in bioaerosol (0.2  $\mu\text{m}$ ) was determined. It was found that the filtration efficacy of cotton cloth was between 43% and 94% in comparison to the fabric used in disposable medical masks which were found to be 98% to 99% (35).

Similarly, another experiment was carried out in which the filtration efficacy of single layers of towels, scarfs, t-shirts, and sweatshirts was determined by using (0.075  $\mu\text{m}$ ) and it was found to be between 10% to 40% (36). Davies et al. (37) reported that the filtration efficacy of tea towel fabric using aerosol-sized particles with a bacterial marker was found to be 83% with 1 layer. With two layers, it was found to be 97%, in comparison to a medical mask having filtration efficacy of 96%. They also determined the filtration efficacy along with the virus. It has been found by them that a single layer of tea towels had an efficiency of 72% and a single layer of t-shirt fabric had an efficiency of 51%, in comparison to a medical mask having filtration efficacy of 90%.



**Figure 3.** The process of aerosol filtration of a cloth mask (38).

It has been confirmed by a study carried out in 2020 that clinically useful percentages of transmitting of the virus have been blocked by some fabrics. Even in the case of aerosols, the filtration efficacy was improved, no matter the layer of fabric was single or multiple (38). When these pieces of evidence are taken into consideration, it can be suggested that many of the types of cloth (though not all) can reduce the transmission by droplet or aerosol. This

could prove useful in effectively reducing the transmission of the virus, including the COVID-19.

#### Use of Niqab as a Cloth Mask

It has been prescribed in the Holy book of Muslims, the Holy Quran that niqab worn by Muslim women is a superior Muslim culture. A niqab is a piece of cloth that covers some parts of the face (39). The population of



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Muslims all over the world is around 1.7 billion (40). The countries where the Muslim population is greater than 90% include Pakistan, Iran, Turkey, Yemen, UAE, Tunisia, Egypt, Bangladesh, Iraq, Lebanon, Afghanistan, and Saudi Arabia. In the census of 2011, almost 14.2% of the population in India was listed as Muslims (41). Women in Muslim majority countries often cover their faces with niqab. However, this accounts for half of the Muslim women population. In one of the studies carried out by Pew Research Center (42), it has been found that only 2% of women agreed to wear the niqab in turkey, 32% in Pakistan whereas the highest percentage of women agreed to wear a niqab in Saudi Arabia i.e. 63%.



**Figure 4.** The Islamic veil; Niqab (43)

It has been recommended by WHO since June 2020 that fabric face masks should be used by individuals in public areas to help reduce the transmission of the COVID-19 virus (44). According to the U.S. Centers for Disease Control and Prevention (CDC), masks not only protect the wearer from contracting the virus but also prevents the transmission of the virus to others in the case of an infected person. Therefore, the percentage of women affected by the COVID-19 in Muslim majority countries was determined. It is reported that in Afghanistan out of the total confirmed cases of COVID-19, only 27% were the women. In Pakistan and Yemen, 25% of the women out of the total COVID-19 confirmed were affected. In Bangladesh, 29% of the women out of the total COVID-19 confirmed were affected. The highest percentage of women affected by COVID-19 was found to be in Iran and Indonesia i.e. 43% and 47% respectively. In comparison to Muslim majority countries, the percentage of women affected by COVID-19 in Muslim minority countries is more. The highest percentage of women affected by COVID-19 is found in Belgium, Scotland, and Netherland which is 62%. Denmark has 57% of the women affected, England and Canada have 56% women affected, 54% of women were affected in Italy whereas, in Germany, 51% of the women were affected by the COVID-19 virus (45).

### DISCUSSION

The study aimed to determine the low-cost measurement of facemask efficacy especially the Niqab against the spread of COVID-19 during the speech. It is evident from the data provided by UN Women (45) that the countries with a Muslim majority where covering the face with Niqab is culture has a less percentage of women affected by the COVID-19 virus as compared to the countries where women do not cover their face with niqab. The filtration efficacy of the niqab can be compared with a scarf or fabric of a t-shirt as described by Rengasamy et al. (36) in their study and hence, it may be effective against

the spread of COVID-19 during the speech.

Similarly, in an animal study, the inward transmission of tubercle bacilli aerosols was determined through a cloth mask on the rabbits. It was found that the unmasked rabbits have 28.5 tubercles per rabbit as a mean number. In masked rabbits, the means number of tubercles per rabbit was 1.4. This shows a filtration efficacy of 95% (46). It can be suggested that benefits should be taken for even a little reduction in the transmission of the virus. This should be in mind because of the severity of COVID-19 and the difficulty in controlling the spread of this pandemic. A slight reduction in transmission can decrease the likelihood of harm. The major mechanisms which are proposed include outward transmission reduction and decreasing the contamination of the surrounding environment. This could be actively achieved by wearing the niqab. Niqab, in similarity to the cloth mask (46), reduces the outward transmission of the suspected virus. This is evident from the smaller number of women affected by COVID-19 in Muslim majority countries where wearing a niqab is common.

### CONCLUSION

A niqab is a cultural part of many Muslim majority countries. Even in non-Muslim majority countries, Muslim women prefer to cover their faces with niqab. In the time of the pandemic, when it has greatly affected the world economy, people are looking for low-cost measures for prevention against the spread of Covid-19. A niqab is made up of different types of cloth and works in a similar way to a cloth mask. It can also be concluded that the lesser number of women affected by COVID-19 in Muslim majority countries could be due to wearing a niqab by most women.

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