



Homemade Cloth Face Masks Identification in Indonesia

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ARTICLE INFO

eISSN: 2356-4067

DOI:10.30597/mkmi.v18i2.18618

Published online Jun, 2022

Keywords:

Masks;

models;

materials;

mask layers;

ABSTRACT

The World Health Organization (WHO) and the Indonesian government have advised the use of cloth face masks by medical and non-medical personnel to prevent Covid-19 transmission. However, many people find it difficult to wear these masks when doing various activities outside their home. The cloth face masks used in Indonesian communities vary significantly in models, materials, and number of layers with a significant number providing discomfort to people. Therefore, this research aims to identify the factors that influence the comfort of cloth face mask model circulating in the public. Phenomenological research design through completed participant observation and open-ended inter-view with seven lecturers and three education personnel were used to obtain more in-depth data. The results showed that despite the availability of various models in circulation, none were comfortable to use while talking and breathing. On the other hand, their straps use a lot of materials causing pain in the earlobe. Therefore, people prefer irrespective disposable masks of their ability to pollute the environment when not properly disposed. In conclusion, it is necessary to have a homemade cloth face mask that provides comfort to people.

INTRODUCTION

Since the outbreak of the Coronavirus in Wuhan, China spread to various parts of the world, masks have become one of the personal protective equipments.¹ This need is also felt by people in Indonesia. In March 2020, the virus came into Indonesia.² The Indonesian government established various rules to make sure Indonesian people want to wear masks.³ Because of this rule, Indonesian people got panic buying to buy masks in large quantities for the benefit of each person and masks were difficult to find because there was less stock in the market, so the price of masks got higher.

The high price of disposable masks causes people not willing to buy masks.⁴ The impact is that more people do not use masks and end up being exposed. On the other hand, people who can buy masks prefer to buy masks that recommended by the World Health Organization (WHO) that it is expensive.⁵ Meanwhile, people who are less able to choose in using temporal masks because the government has set very strict rules.⁶

Surgical and N95 masks are the ideal types that recommended by WHO.⁷ However, due to limitations, they are mainly intended for medical personnels, therefore non-medical personnels are advised to use cloth face masks.⁸ Conversely, these masks are expensive and unaffordable for greater percentage of non-medicals.⁹ This led to the manufacture and sale of cloth face masks from cotton or other materials consist of 2 to 3 layers with various models and shapes.¹⁰ These layers aim to prevent people from easily inhale droplets from others.¹¹

Cloth face masks help to reduce transmission rates, therefore they are highly recommended for non-medical society around the world.¹² However, in reality, many people are not comfortable using any type of mask.¹³ The majority believe that mask causes difficulty in breathing, discomfort, and sweating.¹⁴ Meanwhile, others find it difficult to cover from the bridge of their nose to the chin, therefore it does not optimize the function of face mask.¹⁵

This research is important due to the continuous use of face masks in the new normal era in Indonesia, despite the discovery of a vaccine. Several preliminary studies only examined the absorption of several types of fabric against droplets or spray of saliva when coughing or

sneezing,¹⁶ and the filtration test of certain fabrics.¹⁰ Furthermore, studies have been done on the models that are practically used regardless of their ability to provide comfort and discomfort.¹⁷ This prompted the research on the comfort provided by the three models of cloth face masks commonly worn by people in public.¹⁸ The models were selected and analyzed with data obtained after one-month observation. The comfort referred to in this research includes breathing and talking properly while wearing the face mask as well as ease in using the material and straps for long-term period.¹⁸ Based on the outlined problems above, this research aims to identify the face mask model that is comfortable and often used by Indonesians.

MATERIAL AND METHOD

This is phenomenological research which identifies individual perceptions and experience in using the cloth face mask for better understanding. It also explores in-depth information on participants' experiences while using one of the three models of cloth face masks during outdoor activities (Table 1). Furthermore, complete participant observation and open-ended interviews were conducted to obtain and explore in-depth data. This research involved seven lecturers and three education staff that actively worked at the university during the pandemic. The participants consisted of seven women and three men that were involved based on the criteria determined by the authors which is workers at university of Surabaya aged 25 to 45 years and willing to become participate in this research. The interviews were conducted when participants wore cloth face masks which models had been determined based on the results of the observations. However, this data collection method was difficult because not all participants used these types of masks though, the majority utilized those that are disposable. The restrictions on meeting times, lockdowns, and the use of various mask types prolonged the data collection time by approximately 12 months.

Figure 1 shows the steps used to conduct this research which starts with field observations to determine the model of cloth face masks that often used by the community. The second step is to conduct initial observations as well as analyzing the three models of masks to determine their comfort level. The third step is to examine

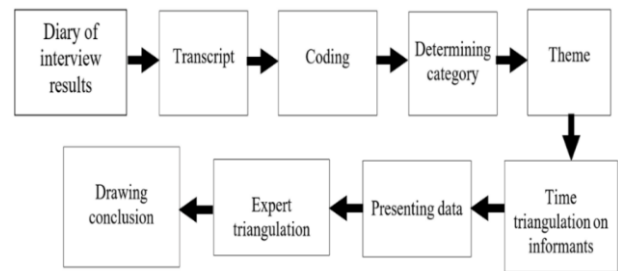
the criteria for the participants, while the fourth step is to develop interview and observation guidelines to avoid deviating from the research objectives. The fifth step is to collect data using open-ended interviews and observation, while the sixth is to analyze the data by coding, reducing, and presenting. Before the data is presented, triangulation is carried out by informants and experts from the health and fashion fields. the triangulation stage was carried out to ensure the validity and reliability of the research results.¹⁹ The final step is to draw conclusions from the research findings. This qualitative research relies on the accountability of data sources and the authors' reliability and validity of interpretations.

RESULTS

The observation results showed the public mask models are 2-ply and 3-ply cloth face masks as illustrated in Table 1. The most people frequently use the 3 models of cloth face masks (Table 1) for outdoor activities.

Furthermore, a total of 10 participants that had used one of the models were interviewed







for in depth data. Interview results found that all cloth mask models in the market place are uncomfortable to wear. The participants interviewed results showed that identified models of cloth face masks that are comfortable to wear is cloth face masks comfortably used in talking, and when used to breathe, they did not stick to the nostrils. On the other hand, the comfort of a cloth face mask depends on the main material and strap. So the models, the main material and supporting materials are the determining factors in the comfort of a cloth face mask while talking and breathing.



Source: Adapted from Coates, Jordan, Clarke¹⁹

Figure 1. Research Flow

Table 1. Comparison of Three Models of Cloth Face Masks Often Used by the Public

Model	Mask Model 1	Mask Model 2	Mask Model 3
			
			
Description	This face mask is made of cotton with a mixture of polyester. It consists 2 of plies clothes with a hole created on the inside to insert a tissue. Therefore, overall, this mask consists of 3 plies, 2 made of cloth and 1 tissue. This model is widely used because it is practical, and the tissue inside is replaceable.	This model is made of 100% polyester, which cannot be easily wrinkled, is resistant to bacteria, and is impermeable to water. It is often used by the public during activities even though it is not recommended by WHO.	This model is made of cotton, and based on observation, the public widely uses it due to the hygroscopic characteristics of cotton.

Source: Primary Data, 2021

DISCUSSION

This section discusses the results of initial observations carried out on three models of face mask cloths generally used by the public (Table 1). It also explains the interview results from users regarding identifying masks that are comfortable to wear in terms of breathing and talking. Then, the interview results and discussion to identify models of cloth face masks that are comfortable to wear. The manual analysis discussed two major themes during interview with the participants. The following provide a detailed description of the interview results and observations.

Uses of Cloth Face Masks

The first theme discussed by participants during interviews on the use of cloth face masks is about the comfort when talking and breathing. The three main keywords are discussed as follows.

The first is masked price. In the question on why participants use cloth face masks, 9 out of 10 stated that they wore them during the pandemic and in the new normal era. According to Cheng, Lam, and Leung, the government-mandated medical and cloth masks to be worn outside home due to the outbreak.²⁰ However, the price of medical masks at the early of the pandemic was unaffordable and very limited.²¹ Therefore, the use of face masks is as follows:

“At the early stage of the pandemic, the medical masks were unaffordable, therefore, cloth face masks were an alternative. Furthermore, assuming the government mandated the use of medical face mask by its self at unreasonable prices would cause financial disruption. Many medical personnels in hospitals require it as personal protective equipment. Meanwhile, for the general public, medical masks are only worn during an emergency. Therefore, the use of cloth face masks is highly recommended because this is not only about affordable price, they can also be used repeatedly in accordance with the washing process recommended by WHO.” (PP_4TECH, PP_6TECH, and PP_3STAFF)

“Furthermore, it also follows fashion trends where the motifs and colors are matched with clothes and colors. Apart from preventing the possibility of contracting the virus, it also acts as a fashion style today.” (PP_1TECH, PP_2TECH, PP_5TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, dan PP_3STAFF).

The cloth face masks currently circulating in the public at affordable price has not been

tested to determine their filtration and comfort level.²² This causes all female participants to buy almost all models of cloth face masks in the market either via online or offline shops to select those that are suitable and comfortable to use. On the other hand, almost all participants stated that they care about the environment by buying cloth face masks. The authors recorded the participants' answers as follows:

“There are various models of cloth face masks in the market which are 2 and 3 plies. The price of a 3-ply is more expensive than a 2-ply. However, people are always curious to try new models to choose the most suitable ones for the pandemic.” (PP_3TECH, PP_4TECH, PP_5TECH, and PP_2STAFF).

“Of the various models of cloth masks that have been purchased, none is comfortable to use.” (PP_1TECH, PP_2TECH, PP_3TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, and PP_3STAFF).

“This is because they have their advantages and disadvantages.” (PP_4TECH, PP_5TECH, PP_7TECH).

“Some are comfortable to use while speaking they sag and repeatedly have to be corrected. Meanwhile, some do not sag while speaking, while others stick to the nostrils, making the wearer uncomfortable.” (PP_1TECH, PP_2TECH, PP_3TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, and PP_3STAFF).

“Buying cloth masks does not only save money but it also helps to reduce mask waste.”

The use of cloth face masks as a substitute is one way to overcome the problem with the current high price.²³ Furthermore, the mandatory use of medical masks also leads to additional expenses every month.

The second major is a daily activity. Daily activities during the pandemic require everyone to maintain healthy life.²⁴ The use of masks during activities is indeed uncomfortable for all participants, however, they must wear during activities outside the home. About 7 out of the 10 participants are lecturers that actively teach during the pandemic. Three of them teach face-to-face (offline) in practicum courses, while the other 4 were mostly online teachers. For the 3 lecturers that taught practicum, the authors noted the following:

“It is almost impossible to meet students at the university during pandemic. However, practicum courses should be done because many students found it difficult to understand some of the courses when it

was explained via online, even though the lecturers had used video calls to teach them individually. Conversely, students' works were less optimal and failed to achieve learning outcomes, thereby limited face-to-face meetings are needed. Therefore, the lecturer ensured that students come to university for a limited number and time. They are required to wear masks and wash their hands or use hand sanitizer before entering class. At the practicum, the lecturers carry out various explanation strategies to ensure students understand the courses. However, they tend to experience discomfort when using a cloth face mask after talking for approximately 2 to 6 hours. Sometimes, students suddenly take off their masks to get air which tends to touch contaminated surfaces. This makes lecturers even more worried because the practicum room uses air conditioner. The cloth masks used also prevent free breathing by sticking to the wearer's mouth and nostrils while talking and breathing. This makes lecturers during offline teaching feel less comfortable in using cloth masks and holding the surface many times to correct its position." (PP_1TECH, PP_2TECH, and PP3TECH).

Furthermore, 4 lecturers that teach online stated that the following:

"Non-practical or theoretical courses can be carried out online and anywhere. However, most lecturers prefer to teach online from their houses because they feel freer and do not need masks for protection. Furthermore, it enables them to speak freely without worrying about the possibility of the cloth face mask dropping from its initial position. Meanwhile, lecturers have many activities to carry out at the university, apart from teaching, therefore, they visit 3 times a week using the cloth face masks in which additional tissue is given. However, they are also worried about the activities carried out outside the home despite using cloth masks with several layers. Meanwhile, some removed and placed their cloth face masks on the table when eating and drinking, even though it was in a room with a lot of people." (PP_4TECH, PP_5TECH, PP_6TECH, and PP_7TECH).

On the other hand, three education staffs use masks while working at the university. At the early stage of the pandemic, the education staff is responsible for the administrative and management processes at the university three days a week to assist with the administrative needs of students and lecturers, thereby they tend to interact with many people very often. However, after more than a year of the pandemic, some of them are coming every day with their noses and mouths covered with cloth masks. The author following:

"The cloth face masks worn by the lectures inside and outside the office were either bought or produced by themselves. Meanwhile, when praying indoors, the majority take off their masks. This is due to various reasons, such as the cloth face mask is stuffy when used to breathe." (PP_1STAFF), "it doesn't need to be worn as long as there are not many people." (PP_2STAFF), "and there is no need to wear it because others already have it on their faces." (PP_3STAFF). "The models, layers, and forms of cloth masks used vary with a greater percentage using those made of cotton. This is because they are worried about the difficulty of being heard by other people, the masks' ability to stick to the nose and mouth when speaking. This makes them always hold its surface when talking." (PP_1STAFF, PP_2STAFF, and PP_3STAFF).

The authors also found another fact while observing the seven lecturers and three education staffs from different universities. They never change their cloth face masks during their activities which lasted for more than four hours. Only those that wore a tissue-covered cloth mask tend to replace the tissue. According to Yudhastuti, cloth face masks have to be changed at least every four hours,²⁵ because its filtration power is lower than medical masks.²² Furthermore, most of the participants took off their masks while eating in one room and placed them on tables contaminated with virus and bacteria without knowing them. This is an important note because the cloth face masks need to remain hygienic and stored in a sterile place before it is reused.²³

Covering the face flaws is the last major. The interview showed that the comfort of cloth face masks when it is used to talk and breathe, covers the face flaws. Most of the participants stated that the mask helped them when dealing with other people. The following observations were noted:

"At the beginning of the pandemic, wearing a cloth face mask was excruciating because the significant amount of those manufactures then made it difficult for people to talk and breathe. However, over time, the mask designs improved with the inception of various motifs. This is one of the factors promoting the current increase in the buying and usage of this commodity. Conversely, masks with various models, designs, and motifs are very helpful in covering the flaws of the participants. Some of the reasons provided by the participants for using cloth masks are

as follows: the motif matches with their cloth." (PP_2TECH).

"It makes them more handsome and beautiful in front of students when teaching online or offline, without wearing make-up" (PP_2TECH, PP_3TECH, PP_4TECH, and PP_7TECH), "it covers flaws on the nose and acne on the face." (PP_3STAFF) "Some of them take advantage of the motifs to increase their confidence even though they sometimes feel stuffy. This often occurs in participants that use glasses which often fog up when talking and breathing. Furthermore, female participants were happy to wear cloth face masks because they did not have to bother using lipstick and could do without make-up. However, others complained that the lipstick often stuck or got smudged inside the mask, thereby making it dirty and irritating to be reused." (PP_1TECH, PP_2TECH, PP_3TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, and PP_3STAFF).

Based on observations, most participants preferred unique mask motifs and colors that matched with their clothes. According to them, embroidery, animated images, batik, and flowers are attractive motifs because they tend to cover face flaws and increase their confidence. Unfortunately, these masks provided discomfort when talking and breathing with cavities or gaps, enabling easy entrance of droplets or viruses. The observations recorded are as follows.

"There are various advantages and disadvantages attached to the cloth face masks. The disadvantages are it is unable to cover the nose perfectly, and the gap is found between the mask and the nose due to the short width from the nose bridge to the chin. Therefore, when the mask is pulled up to cover the bridge of the nose, the chin is not covered and vice versa. Besides, some models are too thin, hence the mask is automatically inhaled and covers the nostrils when breathing. This causes the wearer to rush in gripping the surface of mask to breathe properly. The advantages of cloth face masks are in the motifs and colors."

Based on the interviews and observations, it is found that there are advantages and disadvantages associated with the cloth face masks circulating in the public. Some models are comfortably used in talking, and when it is used to breathe, they stick to the nostrils. Meanwhile, other tends to change position when it is used to talk, hence the participants have to adjust it many times. This means that the outer surface is often touched by the hands, which are various dangerous. Therefore, there

is a need for a comfort test on cloth face masks before they are sold for people to be comfortable in using them in the future.¹⁷

Materials and Models of Cloth Face Mask

The materials and straps determine the comfort associated with a cloth face mask. The participants often expressed two keywords during the interview which are the material and the model of mask and its strap.

Based on the material used, the results of more in-depth interviews were obtained when the participants were asked questions on the materials used in cloth face masks. All stated that cotton is a comfortable material and further questions were used to explore their understanding. Some of these questions include what kind of best cotton material that ideal for cloth masks, how it is chosen, and the process needed to ensure the material is 100% cotton. The participants' answers were recorded as follows:

"Cotton is a material that easily absorbs sweat and comfortable when it is worn." (PP_1TECH and PP_2TECH).

"The comfortable material for cloth face masks is 100% cotton without any mixture." (PP_3TECH and PP_5TECH).

According to PP_4TECH, "this material is comfortable to wear and not stuffy when breathing. Organic and bamboo cotton is comfortable to use for cloth face masks because both are natural fiber, and the price is quite expensive." (PP_6TECH and PP_7TECH).

"It is comfortable to use, not easy to wrinkle, and has cute motifs." (PP_1STAFF and PP_2STAFF).

Based on the records, all participants stated that the comfortable material to use for cloth face masks is 100% cotton. The following provides adequate insight into the process adopted by participants in choosing comfortable materials.

"When making online shopping, participants read a lot of reviews from previous buyers and recommendations from friends. Furthermore, they also asked the seller through online chat media about the material details. Therefore, even after reading the details in the pictures listed on the marketplace, they still tend to ask the seller for several questions before buying. Some bought directly from offline shops to test the material before paying. This was because they were not sure that the masks are sterile. Furthermore, all participants had different opinions in determining whether the material was 100% cotton. Some stated

that they were sure of its texture by referencing the seller. However, it felt uncomfortable when it was worn, especially during outdoor activities in the middle of the day. Others stated that they were hesitant because they only read from the labels on the brands." (PP_1TECH, PP_2TECH, PP_3TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, and PP_3STAFF).

"Meanwhile, not all of the participants bought cloth face masks, those who had the right material manufactured it at home." (PP_1TECH, PP_5TECH, and PP_3STAFF).

Furthermore, when the authors asked for details about the materials used for cloth face masks, it was also recorded that many participants discussed how to take care of it by using washing machine and environmental friendly methods. 3 of 10 participants were environmentally conscious, the interview results are recorded as follows:

"The appropriate cloth face masks are made from cotton that support activities during the pandemic by easing breathing and absorbing sweat. In contrast, medical masks are comfortable and only worn once, hence it pollutes the environment. Although some manufacturers and sellers of medical masks say that they can be washed many times, this can reduce the filter's power against droplets or incoming air. Cloth face masks were preferred because they are easy to take care and it can be washed together with clothes in the washing machine. Furthermore, it can be used many times and are easy to care." (PP_1TECH, PP_2TECH, PP_3TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, and PP_3STAFF).

According to Wang et al., cloth face masks need to be washed using warm water at a temperature of 56°C for 30 minutes.²⁷ Many people do not understand the techniques used to take care of it, assuming it is just by washing.²⁸ It is important to note that it needs to be ironed at a certain temperature for the mask to be sterile again.²⁹

Furthermore, based on materials and models of cloth face mask strap, the supporting materials of cloth face masks, such as the strap, are also the main focus in interview. Based on the observations, many models of cloth face mask straps circulate in the public such as head loop, which women usually use with hijab, ear loop, and those crossed in the back of head area. Furthermore, elastic, and inelastic cylindrical materials were used for the straps. Based on

these observations, the interviews were conducted on the materials and models of the mask straps to determine the participants' opinions. It was recorded as follows:

"The rubber strap on a medical mask is always comfortable to wear in the ear. Conversely, the cylindrical rubber strap on the cloth face mask has a hard surface which painful when it is used in the ear." (PP_1TECH, PP_2TECH, PP_3TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, and PP_3STAFF).

"Usually, this hard cylindrical rubber is used to make accessories." (PP_1TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, and PP_2STAFF).

"Head loop straps are not practical because they have to tie the top and bottom twice, however, this is suitable for women with hijab." (PP_2TECH).

The regular and flat rubber is more comfortable to use, although it hurts after prolonged usage." (PP_3STAFF).

"The strap with the same material as the cloth face mask is comfortable and not practical because it is inelastic." (PP_2TECH).

"The material and model of the strap need to be flexible with face and head shape to avoid hurting them." (PP_1TECH, PP_2TECH, PP_3TECH, PP_4TECH, PP_5TECH, PP_6TECH, PP_7TECH, PP_1STAFF, PP_2STAFF, and PP_3STAFF).

The explanation above shows that the comfort of a cloth face mask depends on the main material and strap. The participants often complain about pain in the ears, face, and back of the head due to the strap. Therefore, they understand the main and supporting materials that are comfortable to use. This is in accordance with the research carried out by Rizki and Kurniawan, which stated that cloth face masks need to be made of cotton that easily absorbs sweat for comfort.³⁰ Also, based on the research carried out by Bae et al., a cotton face mask cannot be just one layer so it requires additional materials,³¹ such as spunbond non-woven polypropylene which has ability to hold droplets and comfortable to use during activities.³² In other words, the models, the main and supporting materials are the determining factors in the comfort of a cloth face mask while talking and breathing.

In addition, the comfort of wearing masks is also determined by cultural psychology, cultural behavior, and understanding in public level that wear masks can maintain better

physical and mental health during the COVID-19 pandemic. Somers described that understanding cultural differences does not only provide insight into the COVID-19 pandemic, but also helps the world to prepare for future crisis.³³ Kemmelmeier and Jami added that masks are also a key tool in the fight against airborne pathogens during the COVID-19 pandemic in the developed countries,³⁴ but the use of masks experiences resistance which is influenced by existing cultural patterns.³⁵ Although, its use in the public can maintain better physical and mental health during the COVID-19 pandemic.³⁵

CONCLUSION AND RECOMMENDATION

Participants' statement regarding cloth face masks spread in the public are still not comfortable to wear for activities, so this was the basis for the development of the first model of cloth masks in this study. These discomforts are indicated when it is used to speak, it moves or sags, and the discomfort associated with breathing and talking. Therefore, second and third cloth face mask models are designed by researchers that prioritizes the comfort of its users during the COVID-19 pandemic and new normal era. With the last cloth face mask model, people are expected to be comfortable in using them to carry out their various activities.

Further research needs to be carried out to examine the pattern of cloth face masks to be tested on the community using materials recommended by this study. This is to ensure people wear the masks comfortably without feeling pain. Eventually, they comfortably use it for activities without fear of having difficulty to talk and breath. On the other hand, the comfort of wearing masks is also influenced by collectivistic culture, cultural behavior, and understanding to wear masks that it can maintain better physical and mental health in the public level during the COVID-19 pandemic.

ACKNOWLEDGMENTS

The Author gratefully thanks to Universitas Surabaya for financial support of this research.

AUTHOR CONTRIBUTIONS

Siti Zahro and Hany Mustikasari conceived and designed the experiments; Siti Zahro performed the experiments; Siti Zahro and Hany

Mustikasari analyzed the data; Hany Mustikasari contributed to prepare experiment materials; Siti Zahro wrote the paper.

CONFLICTS OF INTEREST

The authors declare no conflict of interest. The sponsor in this study had no role in the design of the study; in the collection, analysis, or interpretation of data; in the writing of the manuscript and in the decision to publish the results.

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