Awareness on Usage of Face Masks in Public Places

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Type of manuscript**:** Original study **-** Survey
Running title: Usage of face masks in public places

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Abstract

Aim: To assess the knowledge and awareness on usage of face masks in public places.

Introduction: Face mask is a personal protective equipment that is most commonly used by health care and non-health care professionals. These masks help in preventing the entry of microorganisms or particulates by the help of filtering membranes. Use of face masks during pandemic is an important safety measure for reducing the spread of any air-borne transmissible diseases. Sterilization of face masks can be done through various methods. Customisation of face masks helps economically and is advisable now-a-days.

Materials and methods: A cross sectional survey is conducted online regarding the awareness, sterilization, customisation and usage of face masks in public places through an online portal. The study was conducted in March to May 2020.The results are expressed in the form of bar graphs. The collected data is analysed statistically using SPSS software.

Results and discussion: The current study states that 77% of population have awareness about face mask.78.8% of the population use face mask to prevent entry of liquid droplets. 80.5% of the population preferred customised face mask and 58.5% preferred sterilization of face mask. 56.8% states that it helps in reducing the spread of COVID-19.

Conclusion: The current study culminates that the sample population is aware of using face masks in public places. The awareness on customisation and sterilization of face masks are also represented in the study.

Keywords: Customisation, Face mask, Sterilization, Types of face mask, Uses

Introduction:

Face masks play a very vital role in many places like hospitals, health care centres, laboratories and so on. Face masks are often used by healthcare and non-healthcare professionals (Lakshmi *et al.*, 2019). Facemasks are one among personal protective equipment used widely in hospital settings. It is used to prevent the entry of microorganisms, liquid droplets and pollutant agents with the help of the filter membrane (Ravichandran and Brundha, 2016)(Feng *et al.*, 2020). In an individual level, the use of face masks and maintenance of self-hygiene and Immunization of individuals by vaccines helps to resist the entry and helps in the reduction of transmission of any virus or bacteria(Cowling *et al.*, 2010)(Mp, Brundha and Nallaswamy, 2019)(Brundha, Pathmashri and Sundari, 2019).Surgical face masks offer significant, but not offer complete control of the spread (Dharmadhikari *et al.*, 2012)(Timothy, Samyuktha and Brundha, 2019). Face masks are used not only to prevent liquid droplets and pollutants but also to prevent the exposure of chemicals in working places and inhalation of poisonous gases(Prashaanthi and Brundha, 2018). The first evidence of use of masks is found in the 19th century, was gauze masks which are used by patients to protect the spread of infection. In the year of 1905, Hamilton estimated the presence of Streptococcus in sputum droplets and suggested that HealthCare Workers (HCWs) use masks to prevent the spread of streptococcus infection in operation theatres. It is believed that masks were primarily designed to prevent spread of infections from the wearer. It is known as 'Source control' (Weaver, 1919). Gauze mask prevents the infection that spreads by mouth droplets. They are useful when worn for protection by the sick person and also by the infected person.

SARS and influenza virus are transmitted to individuals via the liquid droplets that are suspended in the air ejected from the infected person (Kumar, Ashok Kumar and Brundha, 2016)(Hannah *et al.*, 2019)(Preethikaa and Brundha, 2018). Several governments of different countries have suggested the population use face masks that play an important role in reducing the transmission(van der Sande, Teunis and Sabel, 2008). Surgical face masks are used only as a controlling measure and not to cure the pandemic. There is a risk of limited access to high level types of respiratory protective equipment like surgical masks and N95 respirators during the air-borne transmissible pandemic situations (Davies *et al.*, 2013). Masks and respirators are the most common products that are represented in the guidelines of WHO to prevent the spread of pathogens through the respiratory droplet and aerosol routes (Chughtai, Seale and MacIntyre, 2013). N95 filtering face respirators are designed for respiratory protection and are best known for the filtering membrane capacity that is found to be of higher quality when compared with other face masks (MacIntyre *et al.*, 2015).

The use of facemasks not only by HCW but also by the non-pharmacological public healthcare workers is important for mitigating disease spread especially among developing countries. The global spread of avian influenza virus (H5N1) was controlled by the use of personal protective equipment and proper isolation measures (MacIntyre *et al.*, 2009). Wearing a surgical mask and N95 respirators by the infected person is alone more than enough to control the spread of an epidemic or pandemic (Longrich, no date). Customisation of cloth masks is also found to be effective based on the materials that are used. The incident of diphtheria and scarlet fever among nurses was found to be reduced in the year of 1918 due to the use of cloth masks at that time (Weaver, 1918). The demerits found in face masks are the restriction of use of masks for long duration, cost efficiency and short supply during an epidemic or pandemic.

The use of face masks by children and chronic respiratory disease patients are found to have a certain impact on them(Shreya and Brundha, 2017).The people may suffocate when face mask is used for a long period of time. Sterilization and reuse of face masks also plays an important role among the public, based on economic status. Sterilization can be done by dry heat, gamma irradiation, ozone decontamination and through ultraviolet germicidal irradiation (Azad, 2020). Recent studies have stated that vaporized hydrogen peroxide is used for the sterilization of masks and is found to be more effective than other sterilising agents(Cramer *et al.*, 2020)(Kalaiselvi and Brundha, 2016). Reuse of face masks is advisable only when the viral or bacterial threat is completely free or it is authorized to be harmless (Bailar *et al.*, 2006). Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Ariga *et al.*, 2018; Basha, Ganapathy and Venugopalan, 2018; Hannah *et al.*, 2018; Hussainy *et al.*, 2018; Jeevanandan and Govindaraju, 2018; Kannan and Venugopalan, 2018; Kumar and Antony, 2018; Manohar and Sharma, 2018; Menon *et al.*, 2018; Nandakumar and Nasim, 2018; Nandhini, Babu and Mohanraj, 2018; Ravinthar and Jayalakshmi, 2018; Seppan *et al.*, 2018; Teja, Ramesh and Priya, 2018; Duraisamy *et al.*, 2019; Gheena and Ezhilarasan, 2019; Hema Shree *et al.*, 2019; Rajakeerthi and Ms, 2019; Rajendran *et al.*, 2019; Sekar *et al.*, 2019; Sharma *et al.*, 2019; Siddique *et al.*, 2019; Janani, Palanivelu and Sandhya, 2020; Johnson *et al.*, 2020; Jose, Ajitha and Subbaiyan, 2020).Hence,the aim of the study is to

assess the knowledge and awareness on usage of face masks in public places and their customisation and sterilization of different types of face mask.

Materials and methods:

The cross sectional survey was conducted online consisting of a sample population of 100 that includes people of Chennai and Vellore districts of Tamilnadu. The institutional review board has given the approval to conduct the study. The study was conducted in March to May 2020. 20 questions are framed to assess the knowledge and awareness of wearing face masks in public places and also about customisation and sterilisation of face masks. Preliminary questions that include their gender and age are mentioned in the survey. Simple random sampling is used to conduct the study. The study is attempted by the people between the age group of 18-40 years. The statistical analysis of responses are calculated by using SPSS software. Chi square test and Pearson correlation analysis were used, with p value less than 0.05 to be statistically significant. The results are represented in the form of pie and bar graphs.

Results:

Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

The results of the present study are put forth in the form of a pie and bar graph in order to analyse the statistical data.

Preliminary questions like age and gender of the respondents and are represented in Figure 1 and Figure 2. 40.7% of the population belongs to 18-25 years. 32.2% belongs to 26-35 years. 27.1% belongs to 36 and above. The percentage of male and female population who attempted the survey are 31.4% and 68.6%.

The awareness of the usage of face masks is represented in Figure 3. 77.1% stated that they are totally aware of face mask usage whereas 16.9% are not aware and 5.9% favoured for either being aware or unaware about the usage of face mask.

The duration of use of face masks in a day by the respondents is represented in Figure 4. 23.7% responded for wearing masks for 1-3 hours a day whereas 53.4% and 14.4% responded for 1-8 hours and 1-12 hours a day respectively. 8.5% respondents say that they use face masks at hospitals and laboratories.

The type of face masks used by the respondents are shown in Figure 5. Elastomeric respirators and N 95 respirators are used by 9.3% and 57.6% of the total population. Cloth masks and handkerchiefs are used by 17.8% and 3.4%. Surgical face masks are used by 11.9% respectively.

The necessity of wearing face masks in public places are represented in Figure 6. 72.9% retorted that they are aware of the type of face masks and 11% are unaware and 16.1% retorted for either they know about the types that are present or they are unaware of the types

of face masks. 89% of the sample population supported that it is necessary to wear face masks whereas 11% objected.

The awareness of using face masks as per WHO guidelines is stated in Figure 7. About 69.5% of the population are aware of using face masks as per WHO guidelines, 11.9% of the sample population are not aware of the use of face masks as per the guidelines and 18.6% had no idea about the ways of using face masks.

The circumstances under which face masks can be used by individuals is represented in Figure 8. 20.3% of the population responded that they use face masks at the time of taking care of sick patients 7.6% and 8.5% responded that face mask is preferred during taking care of aged people and at the time of coughing and sneezing. 63.6% of he population proclaimed that face masks can be used during all the above mentioned circumstances.

The preference of reuse and replacement of face masks is represented in Figure 9. 27.1% supported for reuse and 18.6% supported for replacement of face masks. 542% supported that they would prefer both ways.

The difficulties that are faced by the wearers are represented in Figure 10. 13.6% said that face masks cannot be used for a long duration. 8.5% and 6.8% of the population said that they are short of supply during pandemic or epidemic and they are not well tolerated by children and chronic respiratory disease patients. 13.6% states that they are not cost efficient and 57.6% supported for all the above mentioned difficulties.

The difficulties that are seen in children and chronic respiratory diseased patients due to use of face masks are shown in Figure 11. 61.9% supported that there are no side effects and 16.1% opposed them and 21.2% favoured for maybe.

The association between age and awareness of facemask are represented in Figure 12. Majority of the people between the age groups of 18-25 (29.6%) are aware of using face masks which is statistically significant with a p value of 0.029

The association between age and use of face masks as per WHO guidelines are represented in Figure 13. Majority of the people between the age groups of 18-25 (27.1%) use face masks as per WHO guidelines which is not statistically significant with a p value of 0.667.

The association between age and circumstances of using face masks are represented in Figure 14. Majority of people between the age group 36 and above (23.7%),were aware of using face masks in all the above mentioned circumstances which is statistically significant with a p value of 0.042.

The association between age and extent of using face masks a day are represented in Figure 15. Majority of the age group between 26-35 (21.1%) use face masks to an extent of 1-8 hours a day which is statistically significant with a p value of 0.001.

The association between age and difficulties faced by children and chronic respiratory disease patients are represented in Figure 16. Majority of the people between the age groups of 18-25 (27.1%) face difficulties due to use of face masks which is not statistically significant with a p value of 0.059.

Discussion:

Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree

Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

The current study represents the awareness and usage of face masks in public places. Face masks are used to reduce the risk of spreading of infection especially air-borne transmissible diseases. Around 18-25 years age respondents attempted the survey where female respondents are more among the sample population. 77% of the sample population have stated that they have awareness about face masks and 16.9% are unaware of face masks. It is found that face masks are predominantly used during the time of pandemic, that is stated with the response of 70.3%. The extent of wearing face masks by the respondents is found to be 1-8 hours per day respectively. A study conducted in 2010 has stated that the average time of wearing a face mask is 1-8 hours a day, which supports the current study (Roberge *et al.*, 2010).

57.6% of the population have retorted that they are aware about the types of face masks that are available in the market. A study of 2015 favours that N95 respirators are the predominant type of face masks that is used by the respective population of the study (Chughtai *et al.*, 2015). 78.8% of the sample population proclaimed that they use face masks to prevent the entry of liquid droplets. 76% of the population of the respective study conducted in 2015 stated that they used face masks to prevent influenza like illness (MacIntyre *et al.*, 2009). 89% of the population of the current study responded that it is necessary to use face masks. A study of 2004 supported the necessity of wearing face masks with a percentage of 64%(Tang and Wong, 2004). 80.5% of the respondents preferred using customised face masks as per WHO guidelines.

58.5% preferred for serialization of face masks than to replace them. 52.5% of the population responded that all the methods of sterilization that are mentioned can be used effectively to sterilise face masks. Anthony et al of 2013 stated that gamma irradiation is the best way of sterilization of face masks (Wilson and Nayak, 2016). Both reuse and replacement of face masks is voted by 54.2% of the population. An article of 2010 states that reuse of face masks is an effective way, provided it should be properly sterilised. Respirators should not be reused or sterilised since complete removal of microorganisms from masks cannot be guaranteed and contamination rate is higher for respirators (Bledstein and Bledstein, 2010). 56.8% responded that use of face masks will help in reducing the spread of COVID-19 pandemic (Feng *et al.*, 2020).

61.9% of the population supported the statement that certain difficulties like suffocation and rashes on skin are seen in people who wore face masks especially among children and chronic respiratory disease patients. An article of Oktem et al of 2008 stated that there maybe impact on children and chronic respiratory diseased patients due to wearing of face masks but they are not life threatening impacts(Oktem *et al.*, 2008)(Kumar *et al.*, no date). 65.3% of the sample population responded that vaporised hydrogen peroxide method of sterilization is effective against many microorganisms. An article of 2020 stated that N95

respirators can be sterilised by using this technique and is found to be effective. The limitations of the study includes the small sample population, language barrier and inadequate resources. Several advancement in face masks can be made by increasing the micro-filter membrane and customising face masks that are well tolerated by children and chronic respiratory disease patients that can be inferred in future studies.

Any developmental anomalies on the head and neck region including oral cavity in patients are under risk of respiratory infections (Harsha and Brundha, 2017). Frequent touching of eyes and nose, mouth after contacting the contaminated surface should be avoided. This also produces eye infection(P Jannathulferdioz, no date) and other complications. Studies should be conducted whether COVID 19 can cause nerve palsy as seen in hansen's disease (Brundha, 2015). Quarantine life was enacted by the government for more than three months psychologically affects the general public resulting in stress. The patients with terminal cancer like breast cancer among women and lung cancer among men are at higher risk (Balaji, Brundha and Path, 2016). Pregnant females should be extra precautious on both their health and child (Shenoy and Brundha, 2016).

Conclusion:
From the study it can be concluded that the majority of the participants were aware of the uses, types and techniques recommended by WHO to wear face masks. It is also found that people with chronic respiratory disease face some difficulties like suffocation for a longer duration of wearing masks.

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List of Figure Titles:

Figure 1 represents the distribution of age group of the sample population

Figure 2 represents the distribution of gender of the sample population

Figure 3 represents the use of face mask among the respondents

Figure 4represents the extent of using face mask per day among the respondents

Figure 5 represents the awareness about types of face masks that are available

Figure 6 represents the awareness about necessity of using face masks

Figure 7 represents about the awareness of use of face mask as per WHO guidelines

Figure 8 represents when to use face mask among sample population

Figure 9 represents the preference of reuse and replacement of face masks

Figure 10 represents the difficulties of using face mask

Figure 11 represents the difficulties that are seen in children and chronic respiratory patients because of wearing face masks

Figure 12 represents the correlation between age and awareness of face masks

Figure 13 represents the correlation between age and use of face masks as per WHO guidelines

Figure 14 represents the correlation between age and circumstances of using face masks.

Figure 15 represents the correlation between age and extent of using face masks a day.

Figure 16 represents the correlation between age and difficulties faced by children and chronic respiratory diseased patients.
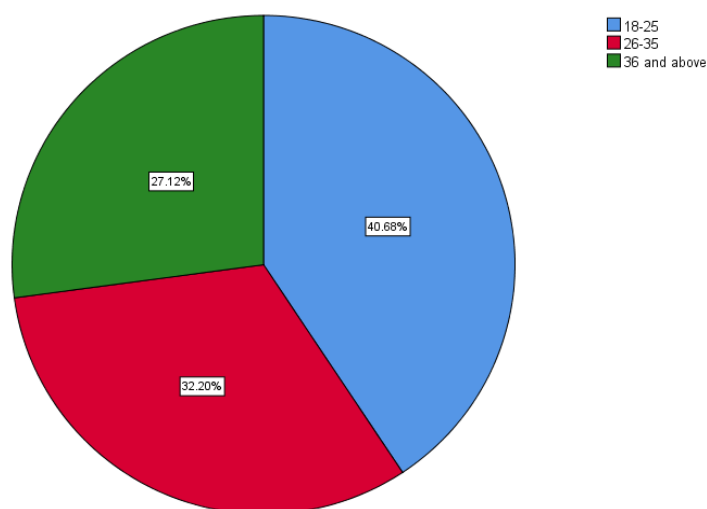
Figure 1: The pie chart represents the age group of the sample population. Majority of the participants belong to 18-25 age group with a percentage of 40.7% (blue) followed by 26-35 age group with a percentage of 32.2% (red) and 36 and above age group with 27.1% (green).
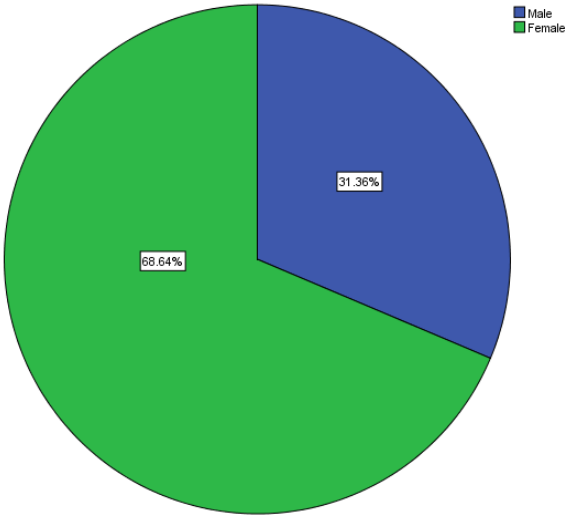
Figure 2: The pie chart represents the gender of the sample population. Majority of the participants are female with a percentage of 68.6% (green) and male participants contribute to about 31.4% (blue).
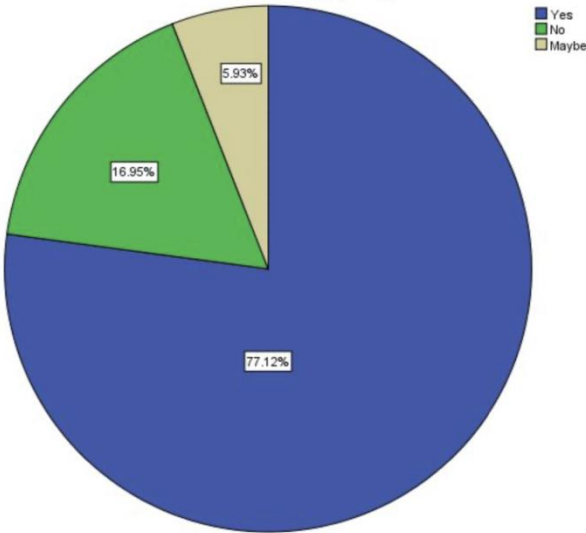
Figure 3: The pie chart represents the awareness about the usage of face masks. Majority of the sample population are aware about the usage of face masks by 77.1% (blue) followed by participants who are not aware of usage of face masks by 16.9% (green) and 5.9% of the participants are either aware or unaware about the usage of face masks (beige).
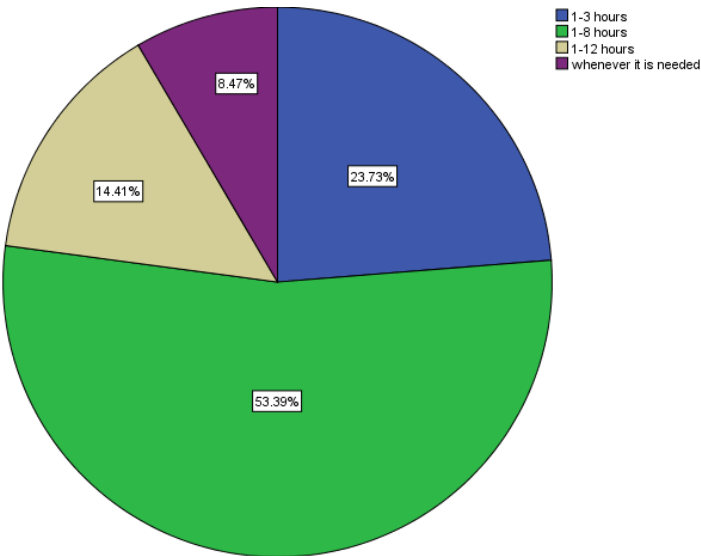
Figure 4: The pie chart represents the awareness about the extent of using facemask per day. the majority of the participants use face masks for 1-8 hours a day with a percentage of 53.4% (green) followed by 1-3 hours with a percentage of 23.7% (blue) and 1-12 hours by 14.4% (beige). 8.5% of the participants use face masks whenever it is needed (purple).
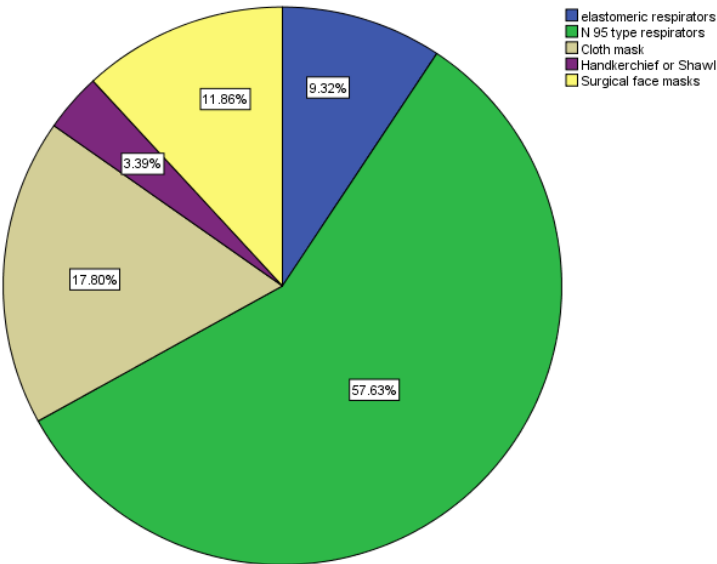
Figure 5: The pie chart shows the use of different types of face masks. Majority of the population, about 57.6% of the participants use N95 type respirators (green), 17.8% and 11.9% use cloth masks (beige) and surgical face masks (yellow). 9.3% and 3.4% use elastomeric respirators (blue) and handkerchiefs or shawls (purple).
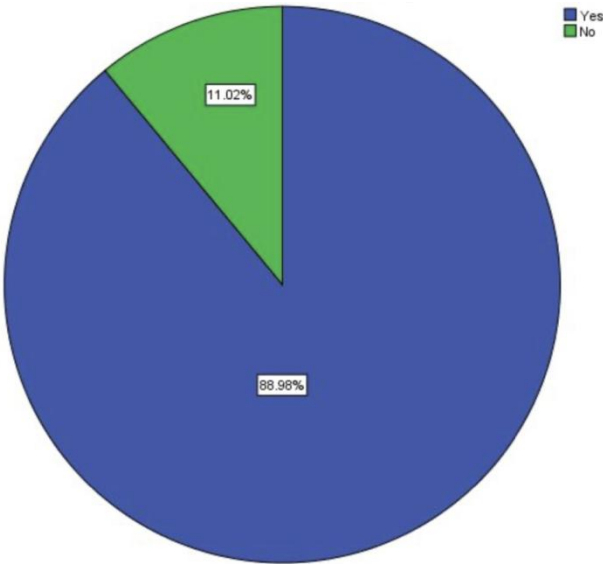
Figure 6: The pie chart shows the necessity of using face masks. 89% of the participants proclaimed that it is necessary to use face masks (blue) and 11% proclaimed that it is not necessary to use face masks (green).
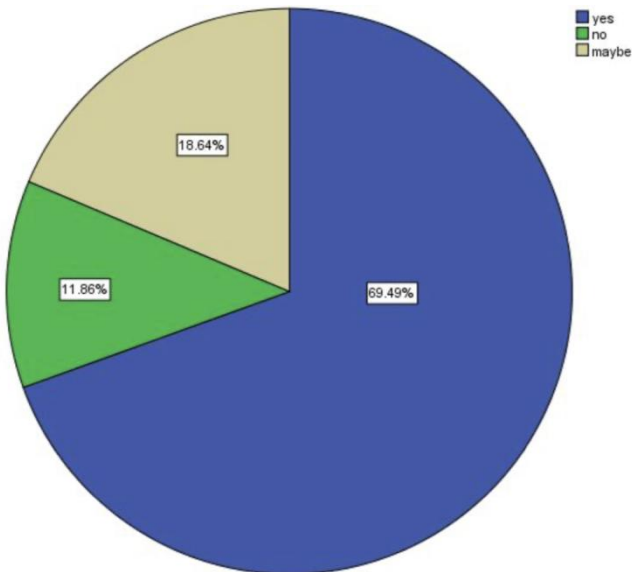
Figure 7: The pie chart represents the awareness about use of face masks as per WHO guidelines. Majority of the participants, 69.5% are aware of using facemasks as per WHO guidelines (blue), 18.6% are maybe aware (beige) and 11.9% are unaware (green).
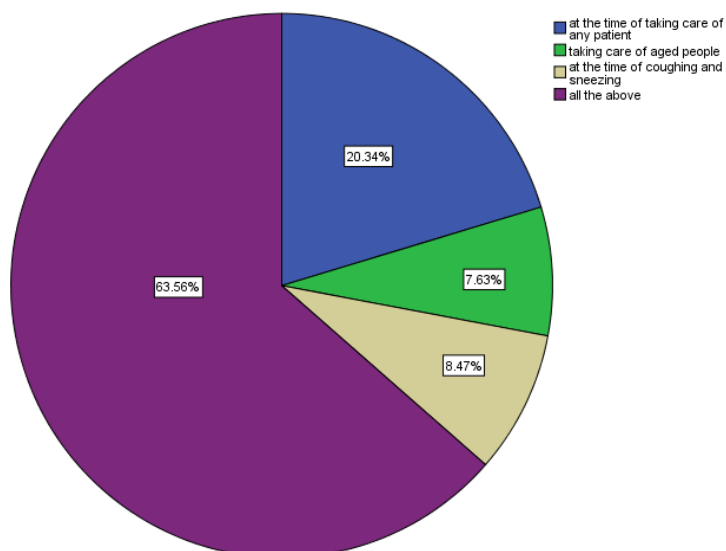
Figure 8: The pie chart represents the awareness among the sample population about when to use face masks. 20.3%, 7.6% and 8.5% of the population use face masks at the time of taking care of any patients (blue), aged people (green) and during coughing and sneezing (beige). Majority of the population, 63,6% use face masks at all the above mentioned circumstances (purple)
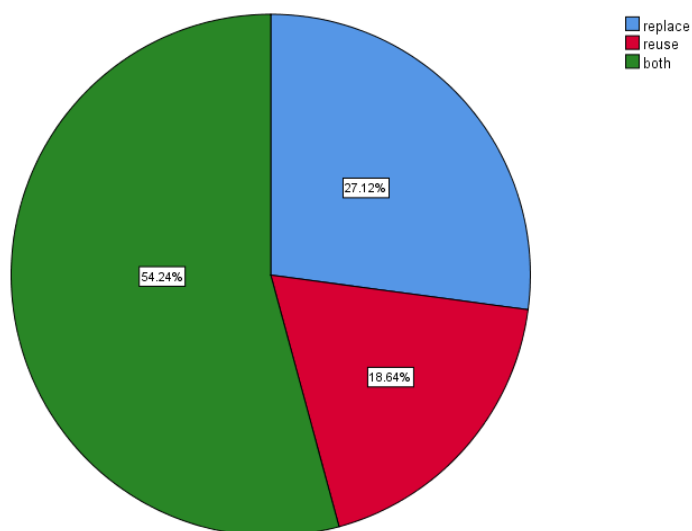
Figure 9: The pie chart represents the preference of reuse and replacement of face masks. 27.1% and 18.6% proclaimed that they prefer replacement (blue) and reuse of face masks (red). 54.2% of the participants, majorly proclaimed that they prefer both replacement and reuse of facemasks (green).
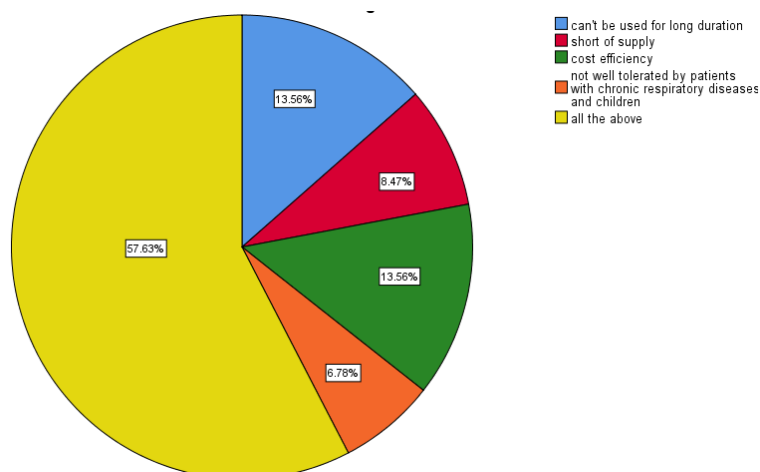
Figure 10: The pie chart represents the difficulties of using face masks.13.6%, 8.5% and 6.8% proclaimed that face masks cannot be used for long duration (blue), short of supply (red) and not well tolerated by patients with chronic respiratory diseases and children (orange). 13.6% proclaimed that it is not cost efficient (green). 57.6%, majority of the participants proclaimed that all the above mentioned reasons are the difficulties of using face masks (yellow).
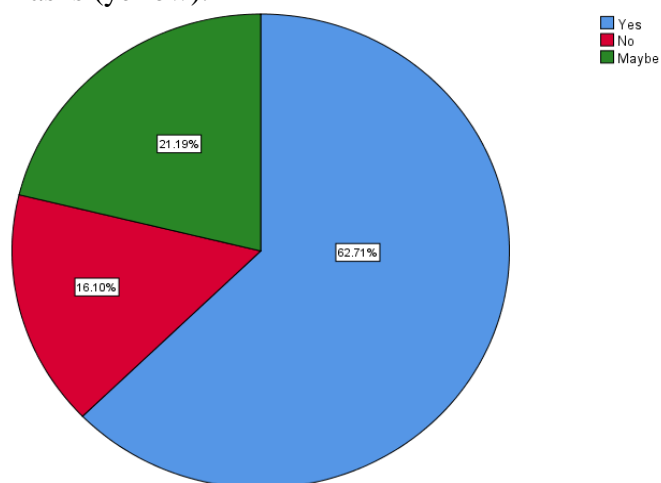

Figure 11: The pie chart represents the difficulties that are seen in children and chronic respiratory diseased patients due to wearing facemask. 62.7%, majority of the participants agreed that difficulties are faced by children and chronic respiratory diseased patients due to usage of face masks (blue). 21.2% and 16.1% of the participants agreed that it may cause difficulty (green) and it does not cause difficulty to children and chronic respiratory diseased patients (red).
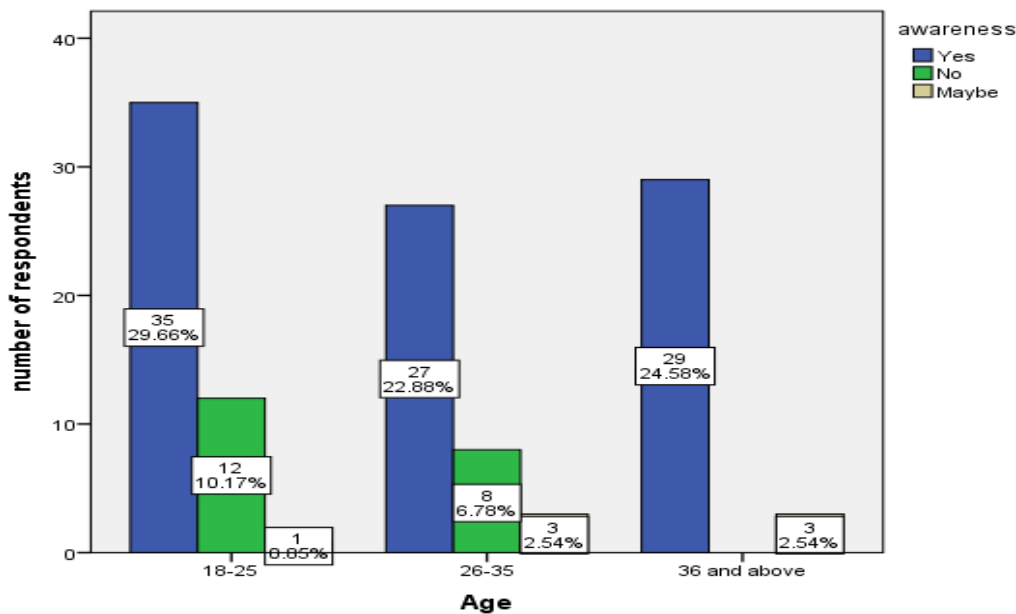
Figure 12**:** The bar graph represents the correlation between age and awareness of using face masks. X axis indicates the age groups and Y axis indicates the number of respondents. Blue indicates that the participants are aware of face masks, green indicates that the participants are not aware of face masks and beige indicates either the participants are aware or not. Majority of the people between the age groups of 18-25 (29.6%) are aware of using face masks. There is a significant difference between age groups and awareness of face masks. The chi square test was carried out to associate the variables. Chi square test value is 10.770. p value = 0.029 (p<0.05). Hence it is statistically significant.
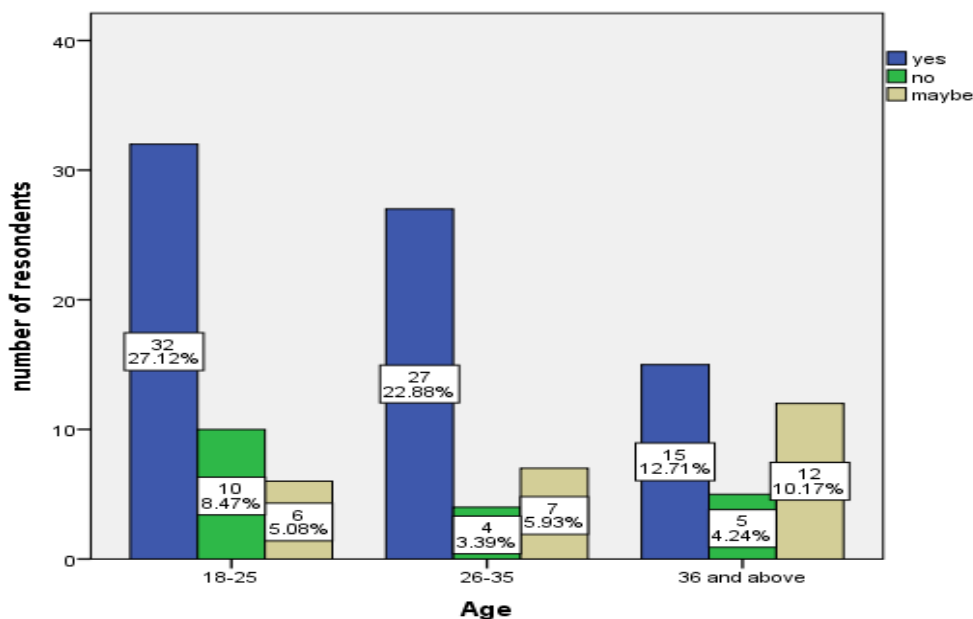

Figure 13: The bar graph represents the correlation between age and use of face masks as per WHO guidelines. X axis indicates the age group and Y axis indicates the number of respondents. Blue indicates that the respondents are aware and green indicates the

respondents are not aware of using face masks as per WHO guidelines. Beige indicates the respondents who are either aware or unaware of using face masks as per WHO guidelines. Majority of the people between the age groups of 18-25 (27.1%) use face masks as per WHO guidelines. There is no significant difference between age groups and use of face masks as per WHO guidelines. The chi square test was carried out to associate the variables. Chi square test value is 2.374. p value = 0.667 (p>0.05). Hence, it is not statistically significant.
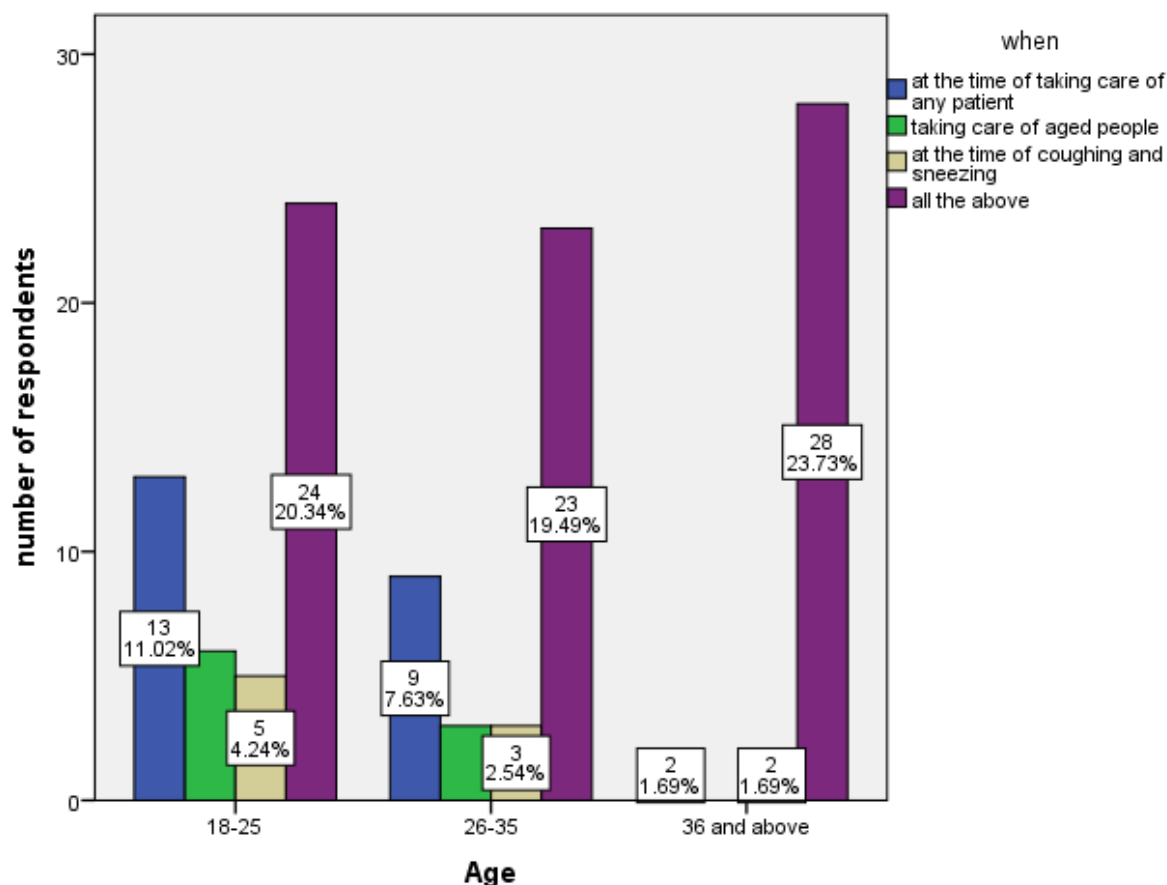

Figure 14: The bar graph represents the correlation between age and circumstances of using face masks. X axis indicates the age group and Y axis indicates the number of respondents. Blue and green indicates the awareness of using face masks at the time of taking care of any patient and aged people. Beige and purple indicates the awareness of using face masks at the time of coughing and sneezing and all the above mentioned circumstances. Majority of people between the age group 36 and above (23.7%),were aware of using face masks in all the above mentioned circumstances. There is a significant difference between age group and awareness of face masks. The chi square test was carried out to associate the variables. Chi square test value is 13.089. p value =0.042 (p<0.05). Hence it is statistically significant.
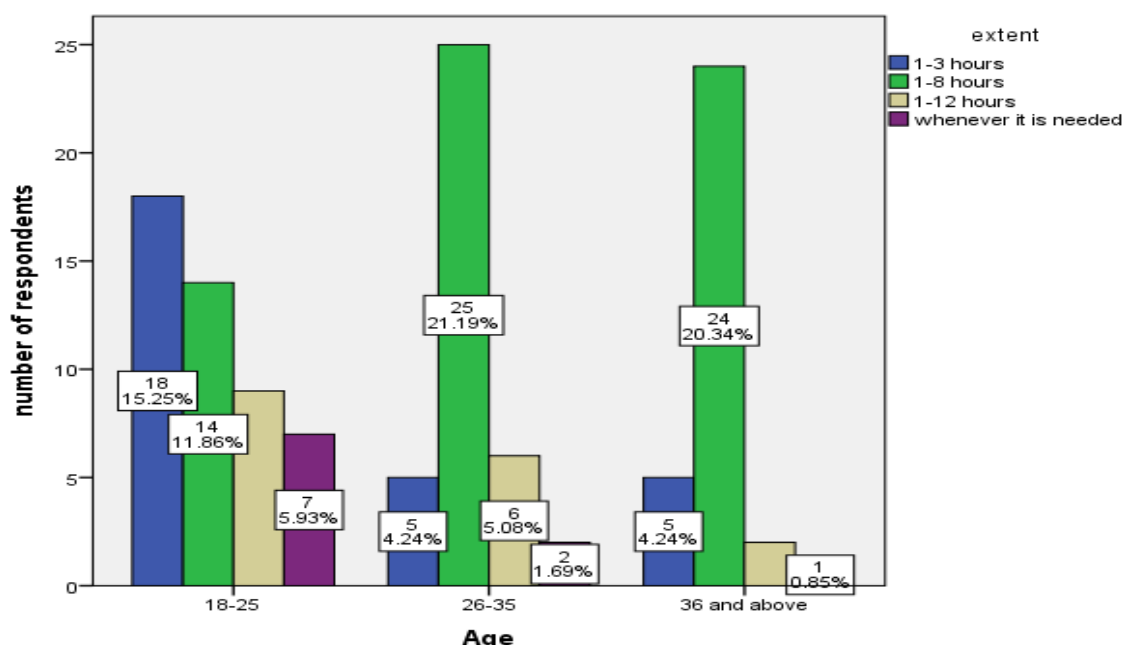
Figure 15: The bar graph represents the correlation between age and extent of using face masks per day. X axis indicates the age groups and Y axis indicates the number of respondents. Blue indicates the use of a face mask for 1-3 hours and green indicates 1-8 hours. Beige indicates 1-12 hours and purple indicates the use of face masks whenever it is needed. Majority of the age group between 26-35 (21.1%) use face masks to an extent of 1-8 hours a day. There is a significant difference between age group and awareness of face masks. The chi square test was carried out to associate the variables. Chi square test value is 21.493. p value = 0.001 (p<0.05). Hence it is statistically significant.
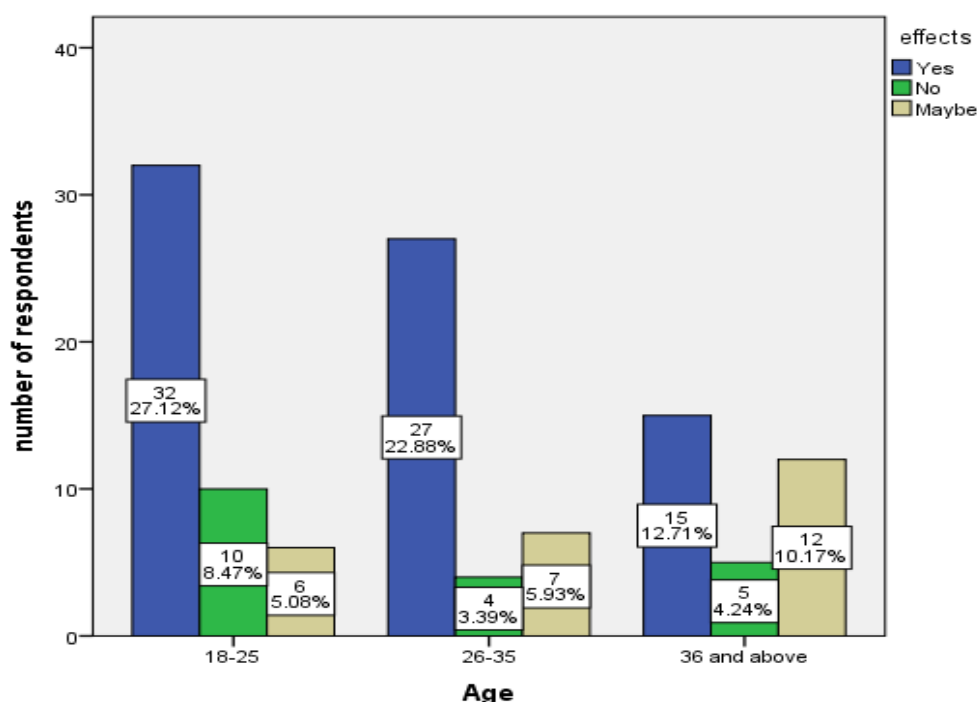

Figure 16: The bar graph represents the correlation between age and difficulties faced by children and chronic respiratory diseased patients due to wearing of face masks. X axis indicates the age group and Y axis indicates the number of respondents. Blue indicates that

difficulties are seen in children and respiratory diseased patients. Green indicates that difficulties are not seen in them and beige indicates either they may experience difficulties or not. Majority of the people between the age groups of 18-25 (27.1%) face difficulties due to use of face masks. There is no significant difference between age groups and difficulties faced by children and chronic respiratory diseased patients. The chi square test was carried out to associate the variables. Chi square test value is 9.093. p value = 0.059 (p>0.05). Hence, it is no statistically significance