Revista Brasileira em Promoção da Saúde
e-ISSN:1806-1230
Original Article
DOI: 10.5020/18061230.2022.12561

COVID-19: a pilot study on mask-wearing behavior in Maputo city

COVID-19: estudo piloto sobre o comportamento de uso de máscara na cidade de Maputo

COVID-19: estudio piloto de la conducta de uso de mascarilla en la ciudad de Maputo

Isaías Benjamim Benzana
Eduardo Mondlane University *(Universidade Eduardo Mondlane)* - Maputo - Mozambique

Alfredo Júlio Maposse
Eduardo Mondlane University *(Universidade Eduardo Mondlane)* - Maputo - Mozambique

ABSTRACT

Objective: This pilot study investigated the mask wearing behavior for the prevention of COVID-19, aiming to determine the magnitude of mask use in public spaces. **Methods**: This was a prospective quantitative study, carried out in the city of Maputo, Mozambique, in February 2020, using the technique of systematic observation through the use of an electronic data collection platform built on Google Forms© to obtain data such as location, gender, use or not of masks, as well as how they are used. The systematic random sampling was adopted and a sample of 1,020 individuals was collected, in two road transport terminals and a market characterized by agglomerations. The collected data underwent descriptive statistical analysis, ANOVA, and T-test for independent samples. **Results**: It was found that 72.9% (744) of the individuals brought a mask; however, only 53% (541) used it properly, covering the mouth and nose. Women had a higher mean compared to men (t=4,471; p=0,000). **Conclusion**: The use of masks in public spaces, evaluated in the city of Maputo, can be considered low, which presupposes high levels of vulnerability to new waves of COVID-19.

Descriptors: Behavior; COVID-19; Personal Protective Equipment.

RESUMO

Objetivo: *O presente estudo piloto investigou o comportamento de uso de máscaras para a prevenção da COVID-19, tendo como objetivo determinar a magnitude do uso de máscaras em espaços públicos.* ***Métodos:*** *Trata-se de um estudo quantitativo de caráter prospectivo, realizado na cidade de Maputo, Moçambique, em fevereiro de 2020, com recurso da técnica de observação sistemática, através do uso de uma plataforma eletrônica de recolha de dados construído no Google Forms©, visando obter dados como o local, o sexo, o uso ou não de máscaras, bem como a forma de uso desta. A amostragem apresentou-se como aleatória sistemática, contando com uma amostra de 1.020 indivíduos, obtida em dois terminais de transporte rodoviário e um mercado, caracterizados por grandes aglomerações. Os dados colhidos passaram por análises de estatística descritiva, ANOVA e Teste T para amostras independentes.* ***Resultados:*** *Verificou-se que 72,9% (744) dos indivíduos traziam máscara, entretanto, apenas 53% (541) usava-a de forma adequada, cobrindo a boca e o nariz. As mulheres apresentaram uma média mais elevada comparativamente aos homens (t=4.471; p=0.000).* ***Conclusão:*** *O uso de máscaras em espaços públicos, avaliado na cidade de Maputo, pode ser considerado baixo, o que pressupõe altos níveis de vulnerabilidade para novas vagas do COVID-19.*

Descritores: *Comportamento; COVID-19; Equipamento de Proteção Individual.*

RESUMEN

Objetivo: *El presente estudio piloto ha investigado la conducta de uso de mascarillas para la prevención de la COVID-19 con el objetivo de determinar la magnitud del uso de mascarillas en los espacios públicos.* ***Métodos:*** *Se trata de un estudio cuantitativo de carácter prospectivo realizado en la ciudad de Maputo, Mozambique, en febrero de 2020, con el recurso de la técnica de observación sistemática, a través del uso de una plataforma electrónica de recogida de datos elaborado en el Google Forms©, visando obtener datos como el sitio, el sexo, el uso o no de mascarillas, así como la forma de su utilización. El muestreo se dio como aleatorio sistemático con una muestra de 1.020 individuos de dos terminales de transporte rodoviario y un mercado*

Received on: *05/10/2021*
Accepted on: *03/04/2022*

caracterizados por grandes aglomeraciones. Los datos recogidos han pasado por el análisis estadístico descriptivo, ANOVA y la prueba T para muestras independientes. ***Resultados:*** *Se verificó que el 72,9% (744) de los individuos tenían la mascarilla, sin embargo, solamente el 53% (541) la usaba de manera adecuada, cubriendo la boca y la nariz. Las mujeres presentaron una media más alta que los hombres (t=4.471; p=0.000).* ***Conclusión:*** *Se considera bajo el uso de las mascarillas en espacios públicos, evaluado en la ciudad de Maputo, lo que presupone altos niveles de vulnerabilidad para las nuevas plazas de COVID-19.*

Descriptores*: Conducta; COVID-19; Equipo de Protección Personal.*

INTRODUCTION

A new Coronavirus (SARS-CoV-2) emerged in the city of Wuhan in December 2019 and has now spread worldwide[1,2]. The main way of transmission of this virus is through respiratory particles[3] from pre-symptomatic, paucisymptomatic, and asymptomatic individuals[4] and the family context has found to be of high contagion and responsible for the rapid growth of the pandemic[5].

The virus has infected around 106,797,721 people worldwide, having caused around 2,341,145 victims until February 2021[6]. In Mozambique, at the same time, official data pointed to a cumulative 46,763 positive cases and about 486 deaths from Coronavirus[7]. Moreover, by January 2021, the country's capital, Maputo, had already become the pandemic epicenter, with almost 50% of cases registered nationwide[8].

Several countries, including Mozambique, have undertaken efforts to contain the virus based on the guidelines of the World Health Organization (WHO). Among these, South Korea can be highlighted, which despite having registered a rapid increase in the number of infections in February 2020, until May had only a few positive cases[1], while in the same period, the United States of America (USA), India, Russia, Brazil, United Kingdom, France, Spain, Italy, Turkey, Germany, Colombia, and Argentina had the highest prevalence rates[6].

In countries with a rapid containment of the COVID-19 outbreak, evidence suggests that masks were a major influencing factor[1,4,9,10], associated with a rigorous screening-testing-treatment program[1], hand disinfection measures, social distancing, and adherence to quarantine protocols[1,4,8].

The use of masks showed a reduction in the transmissibility of infected respiratory particles, both in clinical and laboratory settings[4,11]. In this context, data published in early 2020 showed that South Korea had a 94% rate of mask use, the highest in a 28 countries list, given its culture of mask use[1].

The use of masks seems to be influenced by cultural differences. In European countries, this tends to indicate illness or bad intentions, while in South Korea, it is seen as thoughtfulness and modesty, or even a fashion trend[1]. In the US, due to racial differences, whites were less likely to wear masks compared to Asians, blacks, and Latinos[12]. At the same time, a study carried out in Maputo by the National Institute of Health (INS)[13], aiming to understand the use of masks at the beginning of the pandemic, found that up to about 90.2% of the observed sample wore some mask, however, of these, 27.5% did not wear it properly. Despite the knowledge of the importance of the mask, many people wore it only because it is mandatory in public places.

Given the low incidence of COVID-19 in countries where there is strict observance of the various prevention measures, the use of masks, together with other measures, such as hand sanitizing, social distancing, and contact tracing have proven to be effective strategies to contain the spread of viruses such as SARS-CoV-2[1,4,14,15].

The use of masks by infected people (source control) is a relevant strategy with superior population benefits compared to the use of masks by vulnerable people only, such as health professionals[4,16,11], insofar as they reduce the viral load in respiratory particles and aerosols when used by the infected person. In this aspect, fabric, surgical, and N95 masks have a protective function against the transmission of virus-laden respiratory particles[11].

Several studies prove the effectiveness of mask use in preventing respiratory diseases[5,11,17,18]. For example, a meta-analysis of studies published in several countries found low virus transmission in situations of a social distancing of one meter or more besides the disposable or reusable masks use and eye protection[18]. Another study on the family transmission of COVID-19 showed that the use of the mask, in the primary case still asymptomatic in the family, was 79% effective in reducing transmission, while the use of the mask in the symptomatic phase of the primary case brought little significant protection[5]. In the U.S., as of September 2020, 14 of the 15 states without mask-wearing policies reported higher contamination rates, while eight states with a mask-wearing rate of at least 75% did not have high prevalence rates[19].

Amid the covid-19 outbreak, until June 2020, about 90% of the world population lived in regions that had the habit of using masks in public places or laws were put in place making it compulsory[4], and Mozambique was not any exception, where various decrees followed[20-22]. However, not all countries were unanimous about the use of the mask, and there were cases of policy variation between states in the same country, as in the case of the USA[19].

The Mozambican measures, resulting from official decrees, operationalize a series of procedures to be observed throughout the territory - such as the use of masks or face shields, frequent handwashing with soap or ash, interpersonal distance of at least 1.5 meters, use of cough etiquette, not sharing personal items in addition to broader measures, such as quarantine, isolation, and hospitalization in cases of virus infection. To reduce the spread, at critical moments, the procedures foresaw the limitation of the number of people in any event and the interruption of in-person classes at all levels of education[20-22].

Despite the evidence on the use of masks[5,11,17,18], the behavior of Mozambican citizens remains worrying since, in public spaces, it is frequently verified the existence of people without masks or using them in a non-recommended way[13], not covering mouth and nose, with the mask below the chin, among other forms of handling unsafe use. In addition, news data demonstrate the existence of people reluctant to comply with the recommendations of the Ministry of Health (MISAU) and the WHO[23].

Despite the fact that there was a previous study about the use of masks in Maputo city, it took place at the beginning of the outbreak in Mozambique but it suffered from sampling bias which consisted of also including spaces subject to strict control of the use of masks (supermarkets)[13]. So, the present research aimed to study the magnitude of mask-wearing in public spaces without tight control for the COVID-19 prevention, considering the recommended standards in public spots assuming the possible probability that this behavior has changed with the spread of the pandemic. Thus, the results may serve to provide feedback for the conduction of broader and deeper studies on COVID-19 prevention behaviors, as well as stimulate social reflection around risk behaviors.

METHODS

This was a prospective cross-sectional and quantitative study conducted in the Maputo city, Mozambique, in February 2020 and, the population comprised everyone in public areas elected for data collection[24,25], namely the *Xiquelene* and *Xipamanine* transportation terminals and the Wholesale Market of Zimpeto, where spontaneous behavior of individuals could be observed. These places are potentially crowded, without strict control of masks use.

There were three observation periods (6:20-7:00am; 12:20-1:00pm; and 5:20-6:00pm). At the Xiquelene Terminal, the observation took place in two days in all the three periods; however, at the Xipamanine Terminal and Zimpeto Wholesale Market, the observation took place in only one day in two scheduled periods (6:20 am-7:00 pm, and 12:20 pm-1:00 pm).

The data collection process used an online electronic and systematic observation scheme built on Google Forms© by the researchers. A training session using smartphones connected to the internet was carried out at the Zimpeto Wholesale Market, then a pilot study was conducted to guarantee the sessions appropriate handling of the scheme before the beginning of the final study. The study subjects were unaware of they were being observed. Furthermore, during the pilot observation, the observers positioned themselves at the ends of the entrances, trying to be as discreet as possible, looking at the subjects only once and then proceeding with the recording.

The observation method was used by several authors in research on different types of behavior, such as risky behavior while driving[26-28] and the use of masks[13,29,30]. However, the research developed by the National Institute of Health of Mozambique on the use of masks presents methodological problems that make it impossible to replicate them[13].

This research used a systematic random sampling in which the observer defined the observation radius located at the entrances of the market or transport terminals, selecting a subject every 20-second interval, controlled by an electronic timer (interval timer). The observation started eight meters from the entrance gate and ended when the individual had crossed the gate. If more than one subject appeared at the same time, the closest subject to the observer was considered. Thus, 1,020 individuals were observed at the three data collection sites, in three predefined periods.

Regarding the variables, the research incorporated the following: the period of observation, place, sex, use of the mask at the time of observation, as well as the form of use. The ways of mask use listed were: covered mouth and nose; only mouth covered, mask on the chin, mask on the neck, and mask handheld.

Data analysis consisted of performing descriptive statistics, comparing means using the T-test for independent samples, and the analysis of variance (ANOVA), through SPSS version 20.

The research was approved by the scientific committee of the Faculty of Education at the Eduardo Mondlane University in Maputo. During the study, the guarantee of privacy, autonomy, and confidentiality requirements was presented insofar as there was no manipulation of human tissues or the behaviors of the enrolled subjects.

RESULTS

The study had 1,020 subjects, of which 425 (41.7%) were female, and 595 (58.3%) were male. The Xiquelene terminal accounted for 59.6% (n=608), of the total sample, while the Xipamanine terminal had 21.5% (n=219) and the Zimpeto Wholesale Market had only 18.89%; n =193 subjects. Furthermore, of the three observation periods, the end of the afternoon had the lowest number of observations, as shown in Table I.

Table I - Sex, place, and observation period of the use of a mask. Maputo City, Mozambique, February 2020 (n=1020).

Variable	Category	n	%
Sex	Female	425	41.7%
	Male	595	58.3%
Place	Xiquelene Transport Terminal	608	59.6%
	Xipamanine Transport Terminal	219	21.5%
	Zimpeto Wholesale Market	193	18.9%
Observation period	Morning	415	40.7%
	Afternoon	401	39.3%
	Evening	204	20%

In the sample under analysis, the use of masks was verified in 744 (72.9%) subjects. Of this, only 541 (53%) used it effectively, covering the mouth and nose.

The non-recommended forms of mask use accounted for 19.9% (202) of the subjects observed. Among these, the mask used on the chin (10.8%; n=110) and only to cover the mouth (6.4%; n=65) were the most prevalent modalities, as shown in Table II.

Table II - Pattern of mask use in Maputo city, Mozambique, February 2020 (n=1020).

Variable	Category	n	%
Use of mask	Yes	744	72.9%
	No	276	27.1%
Forms of mask use	Covered mouth and nose	541	53%
	Only mouth covered	65	6.4%
	Mask on the chin	110	10.8%
	Mask on the neck	17	1.7%
	Mask handheld	10	1%

The T-Test for independent samples shows a significant difference between the means of mask use in men (x=1.68) and women (x=1.80), suggesting that women are more likely to wear masks than men (t=4,471; p=0.000).

Regarding the sites, ANOVA did not reveal significant differences (F=1.693; p=0.185) between the three. Additionally, there were no differences (F=1.910; p=0.149) between the three observation periods.

DISCUSSION

Based on the present research data, only 53% of the subjects used the mask in the recommended way, covering the mouth and nose. This number is worrying, as it places approximately half of the investigated population unprotected,

in a context of growing evidence of the virus spread in places of greater agglomeration[11] due to its circulation in the air[11,31], as well as of the possible reduction of transmission of the virus due to the use of mask[5,18,19].

When considering that prevention is individual, the results of this research reflect the actual behavior of citizens in contexts where there is no supervision of the use of masks. In fact, in a study carried out in Maputo, it was found that participants assumed that the strict control observed in supermarkets and public transport was the main factor that impelled them to wear masks[9].

The difference observed in adherence to mask use between men and women in this study is due to several factors- such as physical exertion, invulnerability beliefs, and lack of strict control, among others -, which may be subject to further analysis in future studies. In addition, previous studies show differences in mask-wearing behavior with gender[19,32].

No differences were observed regarding mask use between observation periods and locations in the current study. It may be influenced by the sample size, as similar studies carried out with larger samples and covering large geographic areas prove the opposite[9,10,30].

Not all countries had clear policies mandating the use of a mask, but recent data pointed out an increase in the prevalence of COVID-19 in countries where mask use is not compulsory[1,6,19]. In Mozambique, it is mandatory to wear a mask in crowded places[20-22], hence the need for further studies to correlate the rates of mask use and contamination, as it has been done in other contexts[9,10,19].

The proximity of the results of this study, when compared to those of the National Institute of Health (INS) of Mozambique, carried out in the first half of 2020[13], suggests that, after more than six months, the citizens behavior is still risky. Furthermore, more research aimed at exploring the factors behind this behavior, using theoretical models commonly used in the analysis of health behaviors, such as the Health Belief Model and the Theory of Planned Action, are required, as their results may subsidize the readjustment of health promotion strategies in place.

CONCLUSION

The present study aimed to investigate the magnitude of the use of masks for COVID-19 prevention in the city of Maputo, Mozambique. Thus, it was found that the level of adherence to the use of the mask is low, as only 53% of the subjects used it as recommended, covering the mouth and nose. Women had higher rates of mask use. However, there were no significant differences between locations and observation periods.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

CONTRIBUTIONS

Both authors contributed equally to the elaboration and design of the study, acquisition, analysis, and interpretation of results, and writing or revision of the manuscript.

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Mailing address:
Isaías Benjamim Benzana
Centro de Estudos e Apoio Psicológico – Faculdade de Educação
Universidade Eduardo Mondlane
Av. Julius Nyerere, 3453
Bairro: Sommerschield
CEP: 1202 - Maputo - Mozambique
E-mail: isaiasbenjamim729@gmail.com

How to cite: Benzana IB, Maposse AJ. COVID-19: a pilot study on mask-wearing behavior in Maputo city. Rev Bras Promoç Saúde. 2022;35:12561.