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# Influence of compliance with protection measures to prevent contagion by Covid-19 during the first wave in the district of Barranca

# [Influencia del acatamiento de las medidas de protección para prevenir el contagio por Covid-19 durante la primera ola en el distrito de Barranca]

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Resumen

El objetivo es determinar cómo influye el acatamiento de las medidas de protección para prevenir el contagio por coronavirus en el distrito de Barranca. Se evaluaron los mercados y bancos durante los meses de marzo a octubre del 2020, tomando como muestra a 100 personas seleccionadas aleatoriamente. El acatamiento de las medidas de protección en los mercados se dio de manera gradual, siendo el mes de agosto donde se observó el uso de mascarillas en un 100%, y en octubre el 95% de uso de alcohol, 65% uso de viseras y 58% de distanciamiento. En los bancos, el uso de mascarillas llegó al 100% a partir de junio, en setiembre el uso de alcohol desinfectante fue de 100%, 71% en viseras y en octubre se obtuvo 100% distanciamiento. Se comparó con los resultados emitidos por el Ministerio de Salud, alcanzando un valor máximo de 738 positivos en agosto y un máximo de 33 fallecidos en junio. A pesar que se acataron las normas de protección, el número de contagios se incrementó. Sin embargo, es necesario intensificar de manera eficiente las medidas de protección y control a fin de evitar una segunda ola de contagios.

Palabras clave: Covid-19, contagio, acatamiento, medidas de protección.

Abstract

The objective is to determine how compliance with the protection measures to prevent the spread of coronavirus influences the district of Barranca. The markets and banks were evaluated during the months from March to October 2020, taking as a sample 100 randomly selected people. Compliance with protection measures in the markets occurred gradually, being the month of August where the use of masks was observed in 100%, and in October 95% use of alcohol, 65% use of visors and 58% distancing. In banks, the use of masks reached 100% as of June, in September the use of disinfectant alcohol was 100%, 71% in visors and in October 100% distancing was obtained. It was compared with the results issued by the Ministry of Health, reaching a maximum value of 738 positives in August and a maximum of 33 deaths in June. Despite the protection regulations being complied with, the number of infections increased.

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However, it is necessary to efficiently intensify protection and control measures in order to avoid a second wave of infections.

Keywords: Covid-19, contagion, compliance, protection measures.

## I. Introduction

In the last two years we have witnessed the contest of two countries, the United States and China for world supremacy, which has unleashed a commercial and technological war, which has caused an unprecedented event. Well, in 2019 in the city of Wuhan located in the province of Hubei - China, the first case of Coronavirus was reported, then the World Health Organization (WHO) called it Covid-19. Since that date, it has spread throughout the world in an arithmetic and geometric manner, the effects being increasingly aggressive in some countries of the European Union such as Italy, Spain and France. Thus, on December 31th, 2019, the municipality of Wuhan in the province of Hubei, reported on a group of cases of pneumonia with unknown etiology (Pan American Health Organization - World Health Organization, 2020).

Due to this situation, the Peruvian government made the decision to close the borders and restrict the means of maritime, land, air and river transportation from March 15th, 2020; in addition to establishing measures such as confinement, distancing and biosecurity standards. However, factors such as the need to acquire basic resources, culture, hygiene habits and social gatherings, have caused an increase in Covid-19 infections.

In the Barranca district located in the Barranca province of the Lima region, the first case of Covid-19 was reported on March 15th, 2020, increasing the number of positive cases in the following months. These infections are due to the fact that compliance with prevention, protection and control measures has not been carried out efficiently since most of the population has been infected in banks, markets, shopping centers and other public places, especially in the weekends, where crowding is significant. According to the newspaper El Peruano (2020), markets and supply centers were identified as potential contagion points for the coronavirus. This is supported by what was stated by Cabanillas (2020), that human behavior decisively influences the transmission of Covid-19 and should play a leading role in national public health efforts; Therefore, it proposes intervention variables on promoting health-promoting social norms, promoting prosocial behaviors, and generating trust in authorities and science.

An agglomeration of people was observed in banks, mainly on weekends, which is related to the increase in infections by Covid-19 as stated by the National Institute of Radio and Television from Peru (2020), where the President of the Republic from Peru mentioned that "in these 54 days we have been evaluating where the main sources of contagion are and they are the markets, banks and transport vehicles. In each of these three contagion spaces we have to intervene".

It is necessary to mention that the spread of the virus in the district of Barranca has so far had significant effects, since in the month of August it reached up to 738 positive people and more than 19 deaths, being increasingly harmful, according to the Ministry of Health (2020), in its data, the increase in contagions significantly up to the month of August with 718 positives; but in June there were 33 deaths, and then it drops in October to 131 positives and 5 deaths.

Finally, it is important to mention that compliance with preventive and control measures must be complied with in all public and private places in the city to prevent the spread of the virus and reduce mortality; In this way, a second wave of infections is prevented, which can have more harmful effects. With regard to the latter, from July to October a re-outbreak of Covid-19 has been reported in European Union countries such as Spain, Italy and France, which has resulted in an increase in positives and deaths, and according to what Alamillos (2020) maintains which after

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achieving, through confinements and other restrictive measures, control the first wave of infections, the second has already reached the continent with force.

In the present study, the use of masks, alcohol, visors and distancing were evaluated; However, other forms of contagion have been determined, so it is necessary to expand protection measures such as avoiding touching the handrails of vehicles and stairs in shopping centers, as well as crowds. Therefore, it is recommended to wash your hands constantly, avoid touching your face and distance yourself at least 1.5 m. These prevention measures are based on the provisions of the Ministry of Health (2020), which experts recommend avoiding close contact with anyone who has a fever or cough. It is also necessary to be careful with indirect transmission, that is, that transmitted by contaminated tables, railings, handrails. Hence, the importance of constant hand washing.

## II. Materials and Methods

### Population

According to the National Institute of Statistics and Informatics, INEI, (2017), the district of Barranca has 71,383 inhabitants. And it has 17,129 homes (INEI, 2018), being the district with the largest population with respect to the other districts of the province.

### Shows

100 people were randomly taken per month until October in banking centers and markets to evaluate compliance with the protection measures against Covid-19.

### Evaluation method

The procedures to be followed each week were organized, planned and programmed, making a summary for each month. Attendees at banks and markets were randomly asked if they used alcohol as a disinfectant after their hands came into contact with surfaces and people; At the same time, a visual inspection was carried out regarding the correct use of protection measures against Covid-19, such as masks and visors, in addition to showing whether they maintained the recommended distance.

### Statistical analysis

With the data obtained, a correlation analysis was carried out together with the data reported by the Ministry of Health for the district of Barranca to know the effects of compliance with the protection measures.

## III. Results

Tables 1 and 2 show the percentages of people who complied with the protection measures established against Covid-19 in the markets and banks of the Barranca district respectively, from March to October 2020.

In the case of the markets, 100% use of masks was reached in August, and in October they obtained maximum values of 95% in the use of alcohol, 65% use of visors and 58% in distancing. These results show the increase in the demand and compliance with the measures established in the markets, where tests were carried out on merchants and in some cases sanctions such as the temporary closure of establishments. However, it can be noted that distancing is still not fully respected, so as López and Rodó (2020) point out, awareness of social distancing and the use of non-pharmaceutical interventions should be increased.

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Table 1. Percentage of compliance with protection measures in markets

| Protection measures | March | April | May | June | July | August | September | October |
|---|---|---|---|---|---|---|---|---|
| Masks | 14 | 27 | 45 | 83 | 98 | 100 | 100 | 100 |
| Alcohol | 8 | 17 | 25 | 45 | 65 | 72 | 82 | 95 |
| Visors | 4 | 19 | 23 | 29 | 38 | 46 | 56 | 65 |
| Distancing | 5 | 17 | 20 | 39 | 43 | 48 | 51 | 58 |

As for banks, the use of masks reached 100% as of June and in October it reached 100% in the use of alcohol, 71% in the use of visors and 100% in distancing. This was due to the fact that compliance with the protection measures was demanding and was efficiently carried out by the establishments from entry to exit. As for these control measures, the vast majority were complied with much earlier than in the markets; This reveals the importance of compliance with these protection measures, as noted by Mija (2020), who states that the routes of contagion from person to person include direct transmission by inhalation of droplets of coughing, sneezing, and indirect transmission, by means of fomites that make contact with the oral, nasal or ocular mucous membranes.

Table 2. Percentage of compliance with protection measures in banks

| Protection measures | March | April | May | June | July | August | September | October |
|---|---|---|---|---|---|---|---|---|
| Masks | 24 | 46 | 90 | 100 | 100 | 100 | 100 | 100 |
| Alcohol | 12 | 33 | 45 | 74 | 85 | 98 | 100 | 100 |
| Visors | 2 | 20 | 32 | 45 | 58 | 62 | 66 | 71 |
| Distancing | 21 | 49 | 73 | 85 | 89 | 92 | 96 | 100 |

Table 3 shows the results of the positives and deaths from Covid-19 for the district of Barranca, issued by the Ministry of Health, where an increase in infected persons is observed, reaching maximum values of 738 positives in August and 33 deaths in June; which at the end of October reached 131 positives and 5 deaths.

Table 3. Positive and deceased patients from Covid-19 in the Barranca district

| Patients | March | April | May | June | July | August | September | October |
|---|---|---|---|---|---|---|---|---|
| Positives | 1 | 32 | 95 | 302 | 659 | 738 | 260 | 131 |
| Deceased | 0 | 1 | 5 | 33 | 27 | 19 | 9 | 5 |

Source: Ministry of Health (2020), "DataSet of Deaths and infected by COVID-19"

Figure 1 represents the average between the percentages of people who comply with the protection measures (use of masks, alcohol, viscera and distancing), both in banks and markets, from March to October 2020; as well as the number of positives and deaths, reported by the Ministry of Health for the aforementioned months. Protection measures can be observed gradually increasing; Thus, in the month of October, he obtained 100% use of a mask, 95% use

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of alcohol, 65% use of visors and 58% distance, which corresponds to the lowest number of infections, with 131 infected.

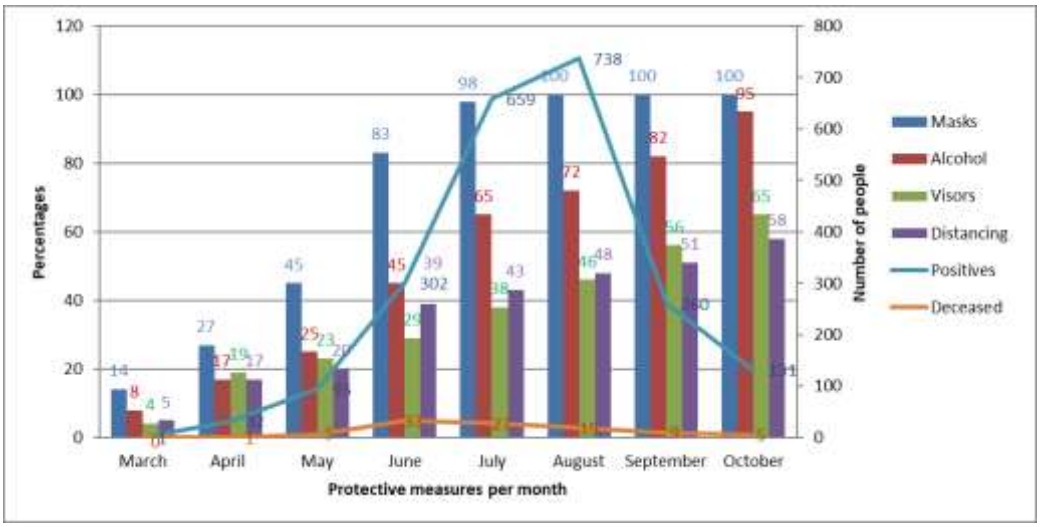


Figure 1. Compliance with protection measures in relation to the positive and deceased.

In order to establish the association between compliance with compliance measures (use of masks, alcohol, visors and distancing) and the number of positive infections by Covid-19, a linear correlation was made for each of them (See figures 2, 3, 4 and 5).
In the statistical correlation analysis that can be seen in figure 2 on the use of a mask with those infected with Covid -19, the correlation coefficient (r) was determined, r = 0.667, a value that indicates a moderate correlation between these two variables, that is, the use of masks influenced in reducing the contagion of Covid-19; so it is necessary to continue with the use of masks. This analysis is based on Laguna (2014), who states that the interpretation of the correlation coefficient depends on the particular context of application; In general terms, it is considered that a correlation is low below 0.30 in absolute value, that there is a moderate association between 0.30 and 0.70, and high above 0.70.

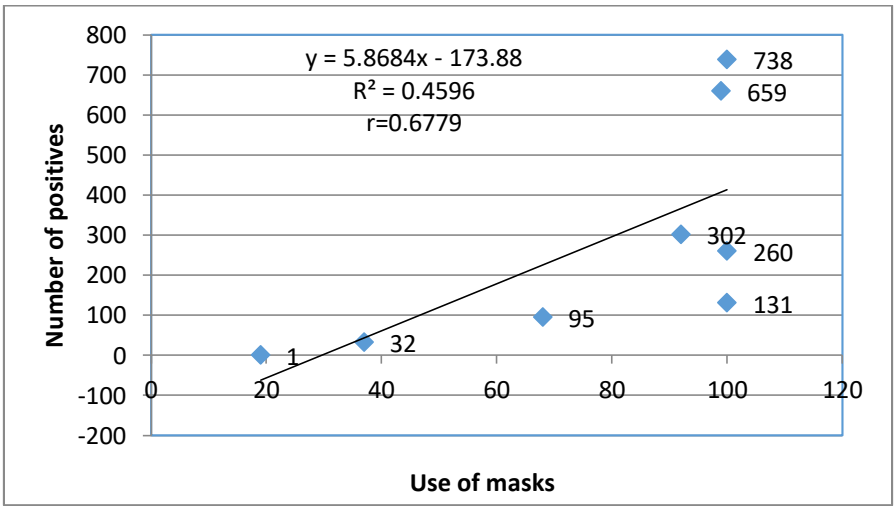


Figure 2. Correlation of compliance in the use of masks.

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In the correlation analysis on the use of alcohol with the number of infected by Covid -19 that is observed in figure 3, it is explained that there is a moderate correlation between these two variables, the correlation coefficient being r = 0.589; According to Laguna (2014), it states that a correlation is low below 0.30 in absolute value, that there is a moderate association between 0.30 and 0.70, and high above 0.70. Therefore, the use of alcohol as a disinfectant can be considered favorable, so its use should be continued.

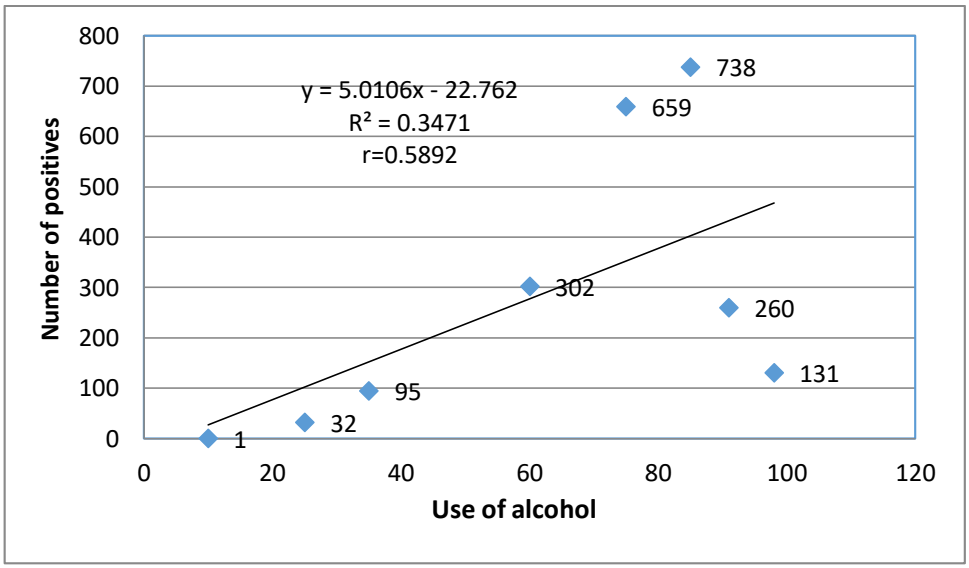


Figure 3. Correlation of compliance with alcohol use.

Continuing with the correlation of the use of visors and the number of infected by Covid-19, which is represented in figure 4, it is interpreted that there is a positive trend and its correlation r = 0.5149, which shows a moderate correlation, according to Laguna (2014); so it is necessary to continue with this use of protection.

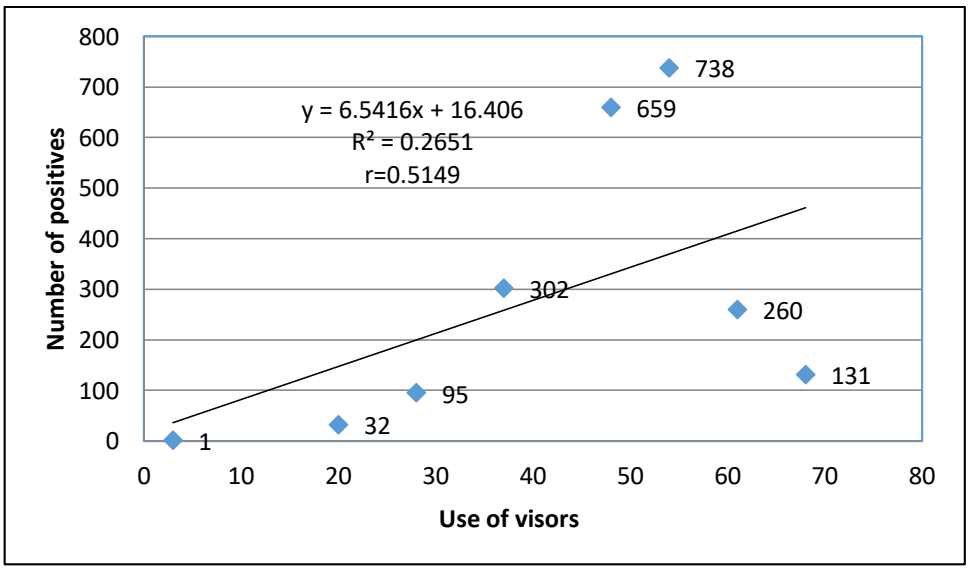


Figure 4. Correlation of compliance in the use of visors.

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Regarding the correlation of distancing with those infected by Covid-19, which is indicated in figure 5, it shows a positive correlation, with r = 0.578, which represents a moderate correlation according to Laguna (2014). This indicates that maintaining distance reduces contagion; so it is necessary to continue avoiding crowds.

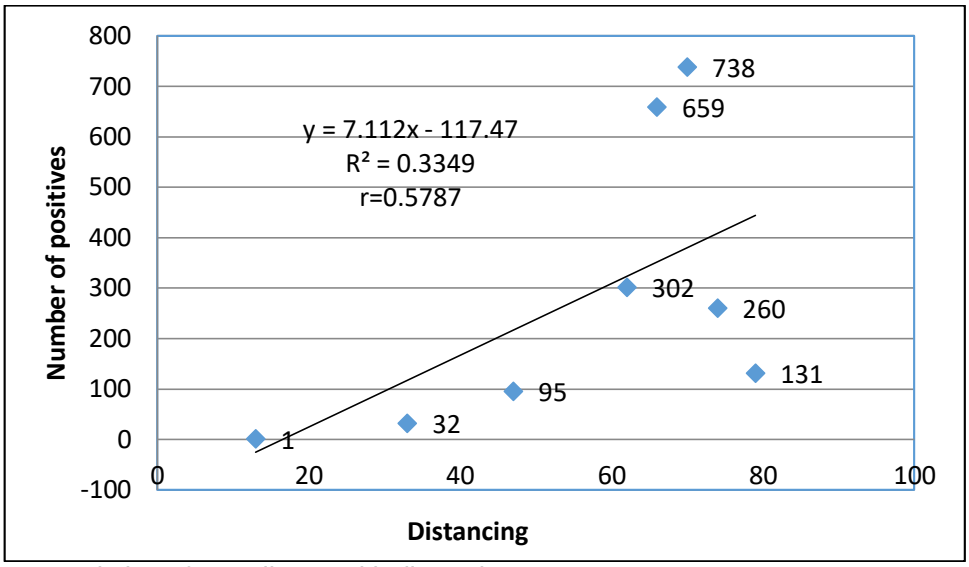


Figure 5. Correlation of compliance with distancing.

Analysis of variance was also carried out, which determined that there was no significance in the use of masks, use of alcohol, use of visors and distance with the increase in the number of infected; Therefore, it is interpreted that compliance with the protection measures fulfills their function of controlling the spread of the disease (see table 4). However, other factors that have not been considered in the present study, such as hand hygiene and material handling, also directly influence the prevention of infections, as indicated by Sedano-Chiroque et al. (2020) on prevention measures applied by the general population such as hand hygiene, respiratory hygiene, educational policies; and prevention measures in health personnel are of great importance to reduce the incidence of Covid-19. However, this result disagrees with that stated by Eikenberry et al. (2020), who through a simulation in the states of New York and Washington in the US, conclude that the wide adoption of face masks, even relatively ineffective, can significantly reduce community transmission of COVID-19 and decrease the peak of hospitalizations and deaths.

Regarding the use of alcohol, it can be explained according to what was mentioned by the World Health Organization (2020a), who affirms that organic matter can prevent direct contact of a disinfectant with the surface and cancel the microbicidal properties or the mode of action of various disinfectants, so that to effectively disinfect a surface, the method used, the concentration and the contact time of the disinfectant are decisive.

Likewise, Table 4 shows the analysis of correlation and variance. It was determined that there is a moderate association in the use of masks, use of alcohol, and in the distance with the number of positive infections, but there is a low correlation with the use of visors. According to Laguna (2014), the interpretation of the correlation coefficient depends on the particular context of application. In general terms, a correlation is considered to be low below 0.30 in absolute value, that there is a moderate association between 0.30 and 0.70, and high above 0.70.

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Table 4. Analysis of variance

| Protection measures | F calculated | F tabulated 5% | Interpretation to 5% |
|---|---|---|---|
| Face mask | 5.1038 | 5.987 | No influyó |
| Alcohol | 3.1904 | 5.987 | No influyó |
| Visors | 2.1640 | 5.987 | No influyó |
| Distancing | 3.0217 | 5.987 | No influyó |

Note: Tabulated F was obtained from degrees of freedom 1 and error 6, from Fisher's table at 5%, which is equal to 5,987.

However, this result should be taken into account as mentioned by the World Health Organization (2020b), which emphasizes that masks should be used as part of a comprehensive strategy of measures to suppress transmission and save lives; Furthermore, wearing a mask alone is not enough to provide an adequate level of protection against Covid-19. As stated by Feng et al. (2020) that the evidence of the use of masks to provide effective protection is scarce; Surgical masks, among the wide variety of masks that have been used, are those that could prevent the transmission of human coronaviruses and influenza viruses from symptomatic individuals (Leung et al., 2020).

One factor to take into consideration is the concentration of the alcohol used, as noted by Kampf et al. (2020), that endemic human coronaviruses can persist on inanimate surfaces such as metal, glass or plastic for up to 9 days, but can be effectively inactivated by 62-71% ethanol surface disinfection procedures.
The distancing is not fully respected in places other than banks, and it is a determining factor in the transmission of the virus.

## IV. Conclusions

- It was determined that compliance with the protection measures occurred gradually, which influenced the increase of 738 positives in August and 33 deaths in June from Covid-19; therefore, the use of protection measures to reduce the spread of infections in the district of Barranca must be efficiently observed.
- In the markets, in August the use of masks was 100% observed, in October the use of alcohol was 95%, visors 65% and distance 58%; therefore, it is considered that as the months passed, compliance with the protection measures increased.
- In the banks, in June the use of masks was 100% observed, in September the use of alcohol was 100%, and in October the use of visors reached 71% and the distance reached 100%.
- It was observed that compliance with the measures occurred mainly in the banks. However, despite the vast majority of protection measures being followed, infections by Covid-19 increased. This may be due to other factors; however, it is necessary to efficiently intensify protection and control measures in order to avoid a second wave of infections.

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