Behaviour of Face Masks Search for Covid-19 Prevention in Indonesia: Trend and Policy Analysis

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ABSTRACT

The studies on the Google searching behavior of face masks can be counted as evidence of how far the netizens' enthusiasm for increasing their knowledge of the proper use of face masks. This current study aimed to analyze the trends in online searching behavior for face masks to prevent Covid-19 in Indonesia. This was conducted quantitatively utilizing Google search trends regarding the comparison between face mask types, including cloth masks, medical masks, and N95 masks in Indonesia after the first case of Covid-19. The mapping of sub-regions with the largest Google Trends filter category was also illustrated in this study. A time-trend analysis was conducted from Google data by describing several policy implementations, including social distancing and transition periods. A correlation analysis was performed by comparing the number of searches for face masks and the total number of Covid-19 cases. It was found that searching for all types of face masks increased in the early stage of the pandemic in Indonesia, while the trend later decreased. After implementing the social distancing policy, the results suggest that searches for cloth masks ranked highest. The increasing number of Covid-19 confirmed cases reduced the tendency of searching behavior for face masks in the category of cloth masks (r2 = -0.1730), medical masks (r2 = -0.1736), and N95 masks (r2 = -0.4329) at p-value <0.05. This study illustrates that the existence of a mandatory policy to use masks will increase mask-seeking behavior in Indonesia.

ABSTRAK

Studi perilaku pencarian masker dapat dijadikan sebagai bukti sejauh mana antusiasme netizen untuk meningkatkan pengetahuannya tentang penggunaan masker yang benar. Penelitian ini bertujuan untuk menganalisis tren perilaku pencarian masker untuk mencegah Covid-19 di Indonesia. Studi ini kuantitatif mengenai tren pencarian Google dengan membandingkan berbagai jenis masker, termasuk masker kain, masker medis, dan masker N95 setelah kasus pertama Covid-19 di Indonesia. Pemetaan proporsi sub-wilayah dengan kategori filter Google Trends terbesar juga ditampilkan dalam studi ini. Analisis tren waktu dilakukan dari data Google dengan mendeskripsikan beberapa implementasi kebijakan, termasuk pembatasan jarak sosial dan masa transisi. Analisis korelasi dilakukan dengan membandingkan jumlah pencarian masker dan jumlah total kasus Covid-19. Pencarian semua jenis masker wajah meningkat di awal pandemi di Indonesia, namun trennya kemudian menurun. Setelah penerapan kebijakan social distancing, pencarian masker kain menduduki peringkat tertinggi. Peningkatan jumlah kasus Covid-19 berkorelasi dengan tren penurunan perilaku pencarian masker pada kategori masker kain (r2 = -0,1730), masker medis (r2 = -0,1736), dan masker N95 (r2 = -0,4329) di nilai-p <0,05. Studi ini menggambarkan bahwa kebijakan wajib untuk menggunakan masker berkorelasi dengan peningkatan perilaku pencarian masker di Indonesia.

GRAPHICAL ABSTRACT

Keyword
covid-19 prevention
face mask search
google trend search
health behavior
social distancing

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INTRODUCTION

As the fourth most populated country in the world, Indonesia has been impacted significantly for a longer time by the Covid-19 pandemic than other less populated countries (Djalante et al., 2020). Indonesia, in addition, has also experienced the highest case of Covid-19 in Southeast Asia in 2020 (Annas et al., 2020). Such confirmed and possible reinfection cases of Covid-19 have been reported in various countries, including Indonesia (Kemal & Anggraini, 2022).

To minimize such risk, people are required to follow accepted infection control practices. One preventive measure encouraged worldwide to limit the transmission of the Covid-19 pandemic is using face masks. It has been mandatory for the public during the Covid-19 pandemic, especially in outdoor activities. Face masks are effective because they can control Covid-19 spread by reducing the number of respiratory droplets from individuals with subclinical Covid-19 (Cheng et al., 2020; Supinganto et al., 2021). For health workers, wearing face masks is a protective tool to ensure their safety and the patients' (Kampf et al., 2020). In society, the controlling transmission of Covid19 can be carried out by washing hands, maintaining personal hygiene, maintaining social distancing, and wearing face masks (Cheng et al., 2020; Goh et al., 2020).

Indonesia faces challenges of people's disobedience in adhering to the Government's policies regarding wearing face masks (Aungsuroch et al., 2020; Rosha et al., 2021; Suwantika et al., 2022). People's adherence to wearing face masks in public needs has to be improved. Indonesian people with various backgrounds and education levels have the potential to have various perceptions about face masks. The increasing age, education level, and knowledge have a significant relationship with the practices of face mask usage for preventing Covid-19 among Indonesian (Kemal & Anggraini, 2022). In addition, the face mask design varies more quickly during the Covid-19 pandemic. It needs current knowledge of the benefit of various face masks before the public decides to use them.

Consistent behavior using face masks, especially outdoors, begins with proper knowledge and continuous learning (Furnaz et al., 2022). Amid technological developments, access to searching for various types of face masks, the benefits of using them, and the opposing sides of face masks can be found using the Google search engine, and it makes it easier to increase public knowledge. Previous studies have stated that search behavior by utilizing Google Trends is beneficial for monitoring netizens' web interests in specific keywords, queries, and topics. It can complement traditional epidemiological studies (Rovetta & Castaldo, 2022). Based on our knowledge, evidence of face mask-seeking behavior, especially during the early days of the Covid-19 pandemic, was not considered in the previous literature.

Studies on the search behavior of face masks can be used as evidence of the extent of the enthusiasm of netizens to increase their knowledge of the proper use of masks. The behavior of searching for face masks using Google trend data is an efficient step as a proxy to find out the consistency and level of awareness of Indonesian people in using face masks during the pandemic. In addition, using Google Trends is one application of big data analysis for better policy advocacy regarding face masks. Therefore, this study aimed to analyze the trends and prediction of searching behavior for face masks to prevent Covid-19 in Indonesia.

METHODS

This study applied a quantitative method with a cross-sectional design. The data were collected using Google based on time trends in

face mask categories. A time-trend analysis was conducted from Google data. The Google search trend analysis was related to the categories of face masks with keywords used in Google search in Bahasa Indonesia, which are "*Masker kain"* (cloth masks), *Masker bedah"* (medical/surgical masks), and "*Masker N95"* (N95 masks). The search period for face mask categories was before and after the confirmed Covid-19 case in Indonesia.

Filters on Google Trends were only limited to 12 categories relevant to the face mask searches. It covers business & industry categories about face mask production, hobbies & fun about exercise activities using masks, laws & Government, which are related to policies regarding the use of face masks, and scientific studies related to studies about face masks. Internet & telecommunication is related to all kinds of news regarding face masks, health concerning the health effects of using face masks, finance concerning mask prices, tourism, sports, work & education, people & society concerning the new normal transition, as well references related to the use of appropriate masks with the users. Web search was only taken because it had a significant proportion for data processing. Only those categories were related to efforts to increase knowledge about the usefulness of using face masks. Meanwhile, other categories, such as food and drink and pets and animals, did not apply to the face mask function.

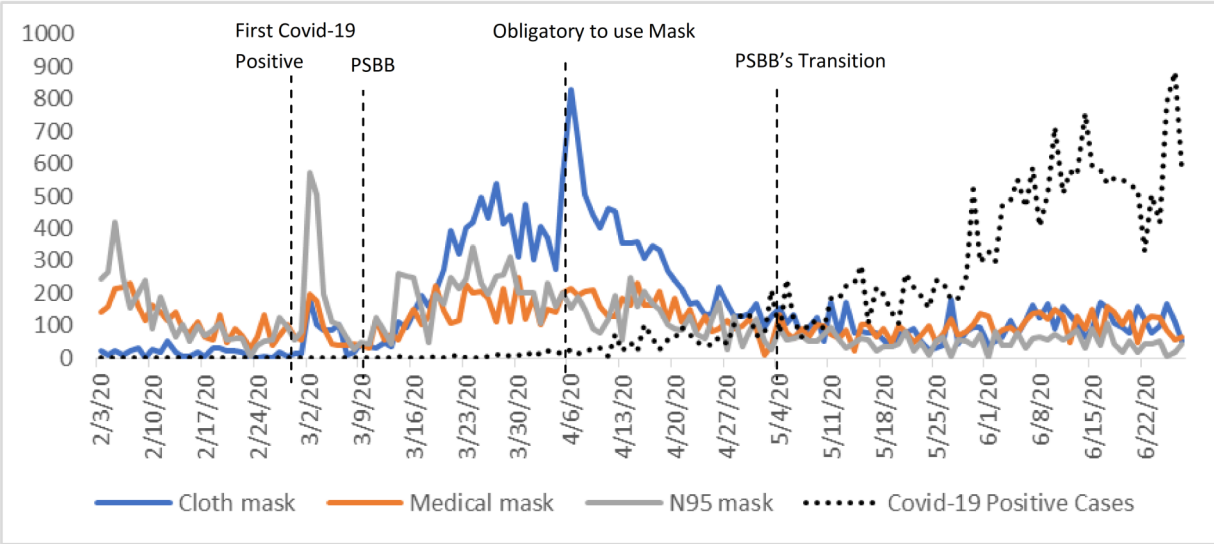
Samples come from various categories of Google Trends. It was taken from the increase in trending with the minimum number of sub-region (province) searches >10, the number of related queries >20, the sorted proportions between queries did not differ significantly, and the number of queries <20, but with a relatively significant proportion of queries. The data were considered missing if the related search result of the sub-region (province) was <10, there was no data on the related query, the proportion increased between the queries significantly differed, and the number of related not-trending queries <20.

The population of this study was taken from all of the sub-regions (provinces) in Indonesia. The search period started from February 3rd, 2020, before the first case of COVID-19 in Indonesia, until June 27th, 2020, two weeks after the new normal transition period after the implementation of the Large-Scale Social Distancing (PSBB) policy. During this period, the policy to prevent the coronavirus underwent many dynamic changes in many parts of the world, including Indonesia (Government of DKI Jakarta, 2020). The President of the Republic of Indonesia ratified the PSBB policy on March 31st, 2020. Meanwhile, the PSBB transition to the new normal started on June 5th, 2020, in DKI Jakarta. The policy for all people to wear masks started on April 5th, 2020. Meanwhile, the first case of Covid-19 was announced on March 2th, 2020. Data of daily confirmed Covid-19 cases in this time range were obtained from the Covid-19 task force of the Republic of Indonesia.

The data collection from Google Trends was carried out by making 12 folders based on the Google Trends' filter category included in the inclusion criteria of this study. Each folder includes a CSV file consisting of time trends and regional comparisons based on the types of face masks (cloth, medical, N95). CSV files were opened with Microsoft Excel 365. The files were then exported to Stata version 14 for further analysis.

The research data analysis was carried out by describing the time trend of the searches based on the types of face masks. The mapping of the proportions of sub-regions with the largest Google Trends filter category was also shown in this study. The trend analysis for the searches for the three types of masks was car-

Figure 1
Google Search for Face Mask Seeking Behavior and confirmation of Covid-19 positive in Indonesia



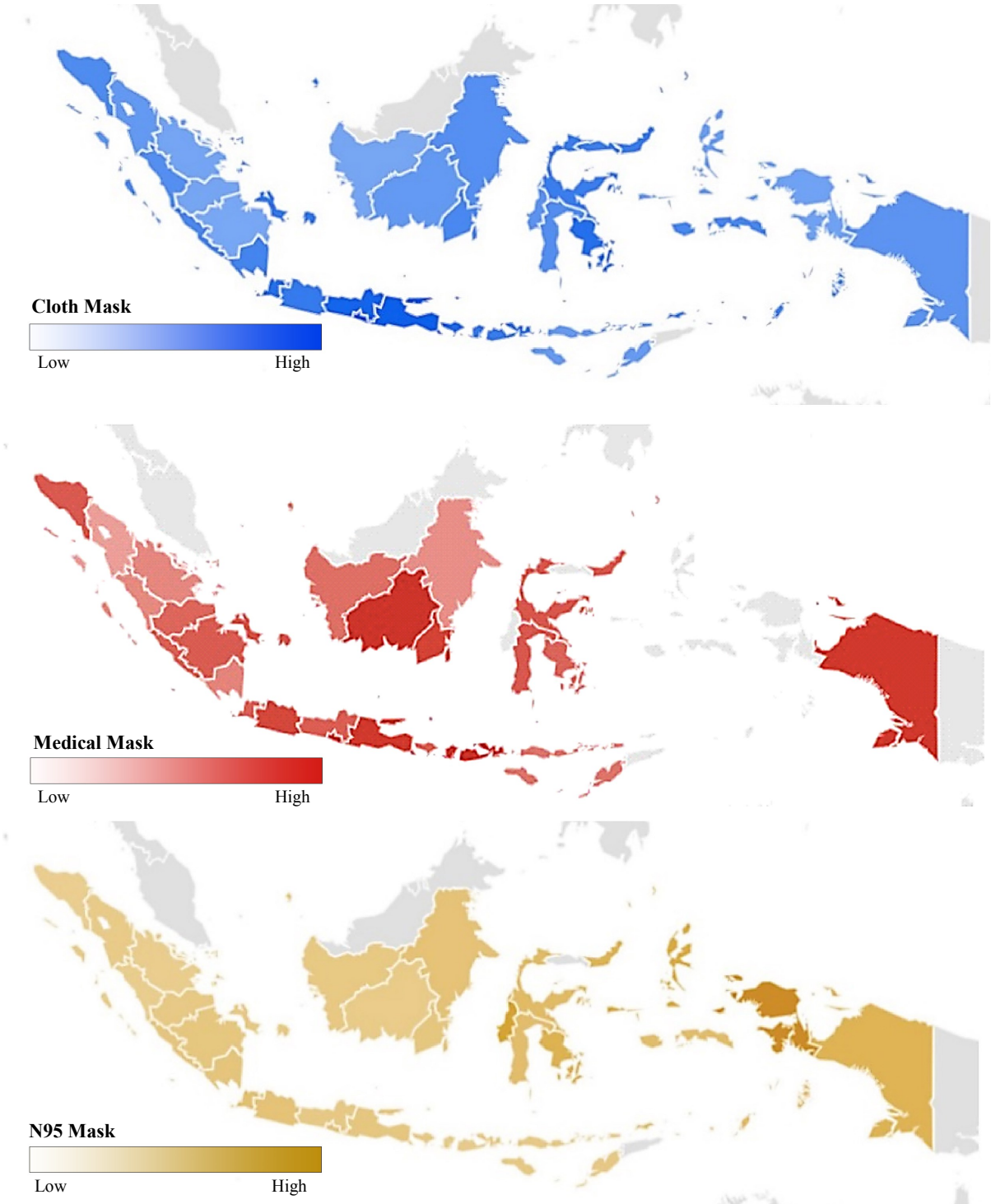
ried out by considering either the increase or the decrease in the number of confirmed Covid-19 positive cases in Indonesia. The cross-tabulation analysis between searching behavior for face masks and policy implementations, including PSBB and transition period, was analyzed in this study. For each type of face mask, correlation analysis was conducted between the number of searches and daily Covid-19 positive cases using the Pearson product-moment correlation coefficient. The r2 and significance values are displayed.

RESULTS

Figure 1 illustrated the data on Google searches for search behavior for face masks and confirmation of Covid-19 positive cases in Indonesia from February 3rd, 2020, to June 27th, 2020. It showed that before the emergence of Covid-19 positive cases in Indonesia, the searches for N95 and medical masks were higher than those for cloth masks. However, after the formal confirmation of Covid-19 positive cases, the type of N95 mask was still ranked as the most commonly-searched face mask by citizens, with an increased number of searches for cloth masks. After implementing the PSBB policy, searches for cloth masks ranked highest. The trend of searching for cloth masks increased, even more, reaching its peak, especially after the mandatory policy from the Government for all citizens to use personal masks while doing daily activities. While moving to the transitional PSBB period, the searches for all mask types (cloth, medical, and N95) showed a drastic downward trend. However, the number of Covid-19 positive cases still consistently increased right after the PSBB transition. During this transitional period, there were no new significant government policies on preventing the Covid-19 spread. The figure showed that the search trend for the three types of masks was stable at less than 200 search points per day.

During the PSBB period, the average number of searches for cloth masks was higher than the other types of masks, reaching more than 200 searches (Table 1). Likewise, after promulgating the obligatory policy to wear masks for all citizens, the average number of searches for cloth masks reached 169.84, the highest number among all types. During the transitional PSBB period to the new normal, the average number of searches for N95 masks was the lowest, with a mean score of 50.91. Mean-

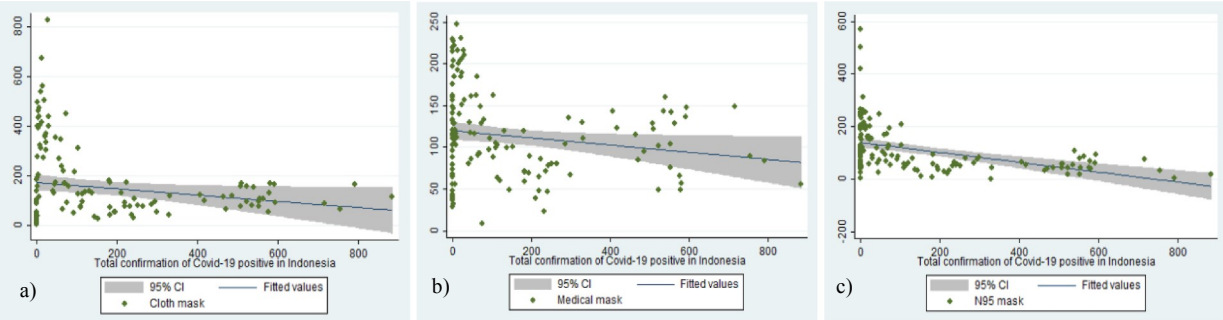
Figure 2
Google Search for Face Mask Seeking Behavior by Sub-region in Indonesia



while, other types of masks, which were cloth masks and medical masks, were being searched more, with a higher average of 116.13 and 109.04, respectively.

Figure 2 showed Google searches for face masks by sub-region in Indonesia for health purposes from February 3rd, 2020, to June 27th, 2020. During this period, Java Island, the representative of urban areas, had the most significant proportion of searches for

Figure 3
Correlations between Face Mask Seeking Behavior and Total Covid-19 Positive in Indonesia



Note: a) r2= -0.1730, p-value= 0.0375; b) r2= -0.1736, p-value= 0.0368; c) r2= -0.4329, p-value= 0.000

cloth masks for health purposes. Meanwhile, for searches for medical masks, some parts of Borneo Island and Papua as representatives of rural areas, and also Java Island as the representative of urban areas performed the highest searches. Lastly, Figure 2 showed that Papua, the representative of rural areas in Indonesia, had the highest number of searches for N95 masks. The results of the correlation analysis showed that the increasing number of Covid-19 confirmed cases decreased the trend of searching behavior for face masks in the category of cloth masks (r2 = -0.1730), medical masks (r2 = -0.1736), and N95 masks (r2 = -0.4329), which occurred significantly with p-value <0.05 (see Figure 3).

DISCUSSION

This study's result indicated that the search behavior for face masks increased at the beginning of the Covid-19 confirmed cases emergence. It showed that public interest immediately increased amid the first surge in Covid-19 cases at the start of the Covid-19 pandemic. This increase in interest could be due to the effect of panic and limited knowledge about face masks. The panic and fear of the consequences of the coronavirus increased people's mask-seeking behavior during that period (Schneider & Leonard, 2021; Roy et al., 2020). However, people's behavioral change is not supported by ample knowledge of the importance of using an appropriate type of mask required (Azlan et al., 2020; Howard, 2020). In addition, info-epidemiology on the use of face masks, both from the Government and scientific journals, was still inadequate at the start of the Covid-19 pandemic.

At the beginning of the implementation of the social distancing policy (PSBB), searching behavior for face masks also increased based on the results of this study. After the mandatory policy on the use of face masks, netizens' search behavior may prefer to choose the type of mask that is comfortable to wear in public places. The existence of pressure coupled with the lack of interest in seeking information has resulted in people not complying with government policies. It is proven by a study in Ethiopia which found that 74.1% of vehicle drivers believed that wearing a mask can prevent Covid-19. However, more than half (52.5%) felt uncomfortable when wearing a face mask, and almost three-quarters (72.2%) of vehicle drivers felt pressure from their local government to wear masks (Natnael et al., 2021). Policymakers can use Internet activity as a complementary data source to develop and implement strategies to control and prevent infection (Lotto et al., 2017).

During the implementation of the PSBB, the average searching behavior for cloth masks had the highest proportion compared to the oth-

Table 1
Trends of Face Mask Seeking Behavior by Dinamic Policy Period

Policy	Cloth Mask		Medical Mask		N95	
	Mean	SD	Mean	SD	Mean	SD
Social Distancing						
No policy	115.08	104.24	117.19	61.27	160.82	117.54
PSBB (Large-scale Social Distancing)	203.39	170.86	112.54	50.16	90.33	60.43
PSBB Transition to new normal	116.13	36.371	109.04	35.75	50.91	26.06
Mask Use						
Sick person and medical personnel only	135.29	114.26	119.09	59.65	162.35	113.41
All of citizen	169.84	149.31	109.9	46.97	74.21	51.13

er types of face masks. It is supported by the mandatory policy of using cloth masks for the general public since the enactment of the PSBB policy and the new normal transition in Indonesia. On June 5th, 2020, the World Health Organization (WHO) issued a guideline for countries whose people have started to get infected with Covid-19, that is for the governments to encourage the citizens to wear cloth-type face masks when traveling and doing activities to prevent the spread of Covid-19 (Cheng et al., 2022). Implementing top-down policies is essential in increasing compliance with wearing masks compared to only spreading negative issues about face masks (Jalloh et al., 2021).

The recommendation to wear masks has been made more imperative to prevent the transmission of Covid-19, especially from people with asymptomatic Covid-19 (Eikenberry et al., 2020). The emergence of the Covid-19 pandemic worldwide has rendered wearing masks ordinary and universal in hospitals and the public (Lepelletier et al., 2020). Face masks have become valuable during the first pandemic peak and are developing in terms of the designs and types for their safety, tolerability, and comfort. It could be the reason for the increasing number of searching behavior for masks at the beginning of the pandemic and the implementation of PSBB in Indonesia, as suggested in this study.

Researchers have promoted the massive use of reusable 12-16-layer cotton masks until the type of transmission of Covid-19 is studied. This recommendation was adopted from the influenza pandemic scenario (Chu et al., 2020). Citizens may use medical and non-medical face masks made from cotton, silk, *etc.* (Hartanto & Mayasari, 2021). In addition, there are also disposable masks consisting of three layers; first, the inner layer, which is called a fibrous material; second, the middle layer (filter part); and third, the outer layer (non-woven, waterproof, and colored). Even though medical masks are more practical for filtering aerosols, cloth face masks and double masks can still be used in public places as an effort to comply with social distancing (MacIntyre et al., 2015). It becomes a demand for the production of layered masks to prevent infection transmission more effectively.

As an archipelagic country with a large population, the knowledge about personal protective equipment especially faces masks, is still diverse (Muslih et al., 2021; Sari et al., 2021; Sulistyawati et al., 2021). This is the cause of the negative correlation between the increase in positive Covid-19 cases and the downward trend in the search behavior for masks. Another study on searching brain tumor behavior showed no observable trends that could correlate to the rising numbers of diseas-

es with a searching behavior (Mondia et al., 2022). As a reasonable prevention effort, the search for masks correlates significantly with an increase in Covid-19 cases as a proxy for reduced public awareness to use masks consistently. Meanwhile, citizens must urgently increase the compliance rate for wearing masks to prevent an increase in positive Covid-19 cases. Dr. Google provides information to answer someone's curiosity but cannot offer counseling to improve health efforts (Cacciamani et al., 2020), including consistency in decision-making to use masks. Moreover, the disparity between regions in Indonesia, where there are still areas with inadequate internet connections, will make it increasingly more work for the public to use Google to search about the benefits of using face masks.

CONCLUSIONS

The trend of face mask-seeking behavior experienced an increase in the early emergence of the Covid-19 pandemic but consistently faced a decreasing trend in Indonesia. Cloth masks are the most sought-after type of mask among the other types, especially in urban areas. Mandatory policy using masks since the PSBB is correlated with increasing search behavior for masks in Indonesia, but with a downward trend. One of the strengths of this study is that it uses big data from Google to analyze trends and policies regarding the search behavior of using masks in Indonesia. This method is expected to become a policy based on research results that the government can apply. It has resulted in more comprehensive policy recommendations. This research is limited to searching behavior trends, not using face masks in Indonesia. Therefore, this study suggests that the Indonesian government should bolster health promotions and disseminate more information about the importance of wearing face masks. First, National Board for Disaster Management (BNPB) provides alert information and directions to consistently use face masks in public places if there is a further increase in Covid-19 infection. Second, the Ministry of Health reproduces detailed information regarding the urgency of using face masks through various media. Third, The Ministry of Industry encourages domestic industries to develop ergonomic face masks against the coronavirus so that mask prices can be more affordable to the public. Forth, the community continues to increase their knowledge of using better face masks to be more consistent in using face masks in public places.

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AUTHORS' CONTRIBUTIONS

Risky K.Hartono designed the study, acquired the data, performed the statistical analysis, interpreted the data, drafted the article and approved the final version to be published. Renny Nurhasana designed the study, acquired the data, reviewed and critically revised the article and approved the final version to be published.

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COMPETING INTERESTS

The authors confirm that all of the text, figures, and tables in the submitted manuscript work are original work created by the authors and that there are no competing professional, financial, or personal interests from other parties.

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