

## On-line Searches for Terms Related to Hand Hygiene During the COVID-19 Pandemic Worldwide

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### ABSTRACT

**Objective:** To analyze the difference in the on-line searches for terms related to hand hygiene during the COVID-19 pandemic in developed and middle-income countries. **Material and Methods:** The cross-sectional study analyzed the digital data through the Google Trends website to obtain the variation of the relative search volume (RSV) through the terms "alcohol gel" and "handwashing." According to socio-economic development, the countries were divided into two groups: countries from different continents and hemispheres, with more than 15 million inhabitants, with more than 50% of the population with access to the Internet network and over 1,000 confirmed cases of infected with COVID-19. The paired t-test was applied to compare the means. The significance value adopted was  $p < 0.010$ . **Results:** The searches related to the term "hand washing" were more significant when compared to the term "alcohol gel," and the term "alcohol gel" presented a higher average volume of research in developed countries ( $p < 0.010$ ). The developed countries had a higher average relative volume of research than middle-income countries ( $p < 0.010$ ). Developed countries sought more for the term "alcohol gel," and the term "hand washing" showed no difference in the volume of research about the country's socio-economic aspect. **Conclusion:** Developed countries have a higher volume of search for hand hygiene terms. The middle-income countries must create proposals for raising awareness outside the on-line environment so that this information reaches the entire population during the pandemic.

**Keywords:** COVID-19; Hand Hygiene; Developed Countries.

## Introduction

After the first confirmed case of the new Coronavirus (COVID-19) in Wuhan, China, the disease spread rapidly worldwide. As a result, the disease was classified as a pandemic by the World Health Organization (WHO) in March 2020 [1]. From the global context, media outlets and agencies responsible for health began to disseminate information about the form of contagion and prevention of the new virus [2]. Among the numerous measures recommended to prevent health from the new virus, basic health prevention concepts have been strongly recommended, such as hand hygiene, since the virus transmission can occur through contact with contaminated surfaces [2,3].

Hand hygiene is a useful measure in preventing disease transmission since adequate hand hygiene has a 24% to 31% probability of decreasing the spread of infectious diseases [4,5]. In the context of COVID-19 disease prevention, the World Health Organization recommends washing hands with soap and water after coughing or sneezing, visiting a public place, touching surfaces outside the home, before and after eating, and after contact with sick people. When soap and water are not available, alcohol gel or alcohol-based disinfectants can be used [4].

With the dissemination of information technologies, people started to have more autonomy to seek knowledge about health prevention on digital platforms [6,7]. In this context, Google (Mountain View, CA, USA), which is already a widely used tool, tends to have its use, even more exacerbated in the face of a pandemic that affects the whole world. The information derived from this platform is an important aid in health prevention, in addition to providing valid information for estimating epidemiology and collecting data on disease patterns and population behavior [8,9].

The search for terms in the research platforms can be influenced by many factors, such as each individual's ability to understand and process information [7,10]. In addition, social, economic, political, cultural, and even psychosocial factors can influence the search pattern, making health-related research likely to show different behaviors between individuals from developed and middle-income countries [7,11,12]. In light of the above, the hypothesis tested was that middle-income countries have less search volume than developed countries. Therefore, the objective was to analyze the difference in the on-line searches for terms related to hand hygiene during the COVID-19 pandemic in middle-income and middle-income countries.

## Material and Methods

### Study Design

This cross-sectional study analyzed the digital data through the Google Trends website (<https://trends.google.com>) to obtain the variation of the relative search volume (RSV) through the terms "alcohol gel" and "hand washing". Google searches from developed and middle-income countries were considered from 01/07/2020 to 04/04/2020, in the languages: English, Spanish, Portuguese, Arabic, Japanese, and Russian, according to the native language of each country.

The Google Trends website (<https://trends.google.com>) represents the results of varying queries for specific keywords, with values ranging from 0 to 100. These values represent the proportion of search volume for a particular keyword for general searches detected at a given time.

### Data Collection

Ten countries were considered, divided into two groups, according to their socio-economic development. The selection criteria for these countries were: countries of different continents and hemispheres,

with more than 15 million inhabitants, with more than 50% of the population with access to the internet network, and with more than a thousand confirmed cases of infected by COVID- 19 [7]. In addition, countries were classified as developed and middle-income, according to the United Nations [13]. The developed countries were composed of Australia, Chile, Japan, the United Kingdom, and the United States of America. The group of middle-income countries, on the other hand, was composed of Brazil, Mexico, Russia, Saudi Arabia, and South Africa. Chart 1 shows the criteria used to choose these countries.

**Chart 1. Criteria used for the selection of developed and middle-income countries.**

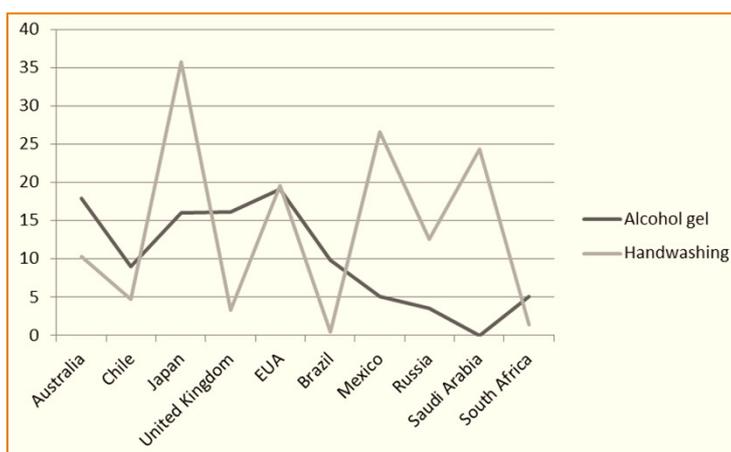
Criteria for Selecting Countries
1. Different continents and hemispheres
2. Population with more than 15 million inhabitants
3. More than 50% of the population with access to the internet network
4. Over a thousand confirmed cases of COVID-19 infected

### Statistical Analysis

The relative search volume for each selected country was considered according to the two terms searched. The survey means were calculated, and the paired t-test was applied to compare the means. The significance value adopted was  $p < 0.010$ . The analyzes were performed using the SAS statistical program (SAS Institute Inc. 2011, version 9.4, NC, USA).

### Results

Figure 1 shows the average of the relative search volume of each country according to the selected terms. In general, it is observed that the research related to the term "hand washing" was greater when compared to the term "alcohol gel." Only in Australia, Chile, United Kingdom, Brazil, and South Africa searched for "alcohol gel" to prove greater.



**Figure 1. Average of the relative research volume (RSV) of each country in relation to alcohol gel and handwashing research.**

Table 1 shows the average and standard deviation of developed and middle-income countries' relative research volume about the selected keywords. The term "alcohol gel" showed a higher average volume of research in developed countries when compared to middle-income countries ( $p < 0.010$ ). There was no statistically significant difference in the relative volume of "hand washing" surveys for developed and middle-income countries ( $p > 0.010$ ).

**Table 1. Average and standard deviation of the relative research volume of developed and middle-income countries about "alcohol gel" and "hand washing" surveys.**

Variables	Mean (SD)	p-value
Alcohol Gel		
Developed	15.64 (3.94)	0.0008
Middle-Income	4.70 (3.52)	
Hand Washing		
Developed	14.75 (13.39)	0.4206
Middle-Income	13.07 (12.31)	

#Countries were classified as developed and middle-income, according to the United Nations.

Table 2 presents the average and standard deviation of the relative search volume in general, including the two keywords selected for the group of developed and middle-income countries. Considering the group of countries studied, it is possible to observe that developed countries have a higher average relative volume of research than middle-income countries ( $p < 0.010$ ).

**Table 2. Average and standard deviation of the relative research volume of developed and middle-income countries.**

Countries#	Mean (SD)	p-value
Developed	15.19 (9.32)	0.0766
Middle-Income	8.88 (9.61)	

#Countries were classified as developed and middle-income, according to the United Nations.

## Discussion

The COVID-19 pandemic is growing rapidly world [1,14-16]. Thus, it is expected that research related to prevention will also increase in this period. In addition, Google search data can be a valuable resource of information, assisting in the management and event planning of health resources [1,16].

Our results showed that, in general, the countries' research volume indicative shows a greater number of searches related to the term "hand washing" when compared to "alcohol gel". Furthermore, a recent survey that evaluated data from Google Trends showed that research indicates that people started looking for the term "hand washing" when the masks for personal protection were running out [14]. This is similar to what has been happening with hygiene products, such as alcohol gel, which is in short supply in the market.

The lack of hygiene products and personal protective equipment for health professionals and sick people is due to the excessive and disordered use of these materials by healthy people, overloading the production system and quickly depleting them from the market [2]. In addition, the media can play an important role in this context since the frequent exposure of people's images using personal protective equipment and hygiene products can increase population consumption [2].

In our results, the term "alcohol gel" had a higher average volume of research in developed countries than in middle-income countries. A possible justification for this finding may be the purchasing and consumption power of these countries, which is greater due to their socio-economic situation.

Among the hygiene measures most cited during the pandemic, hand washing stands out [3]. It is believed that the COVID-19 virus is transmitted through droplets, which can also occur through direct contact with contaminated surfaces [2]. In this context, proper hand washing is essential to prevent contagion. However, in our study, hand washing did not present an average of different research volumes between developed and middle-income countries. One fact to think about regarding these results is the strong influence of the media and the bodies responsible for health, which has strongly encouraged preventive actions at this time.

Middle-income countries have undergone digital inclusion, which leads to a significant increase in research related to the web [7]. However, our study results indicate that developed countries still have a higher average volume of research in the face of a worldwide pandemic. These findings can be justified because Internet users are more likely to access the web searching for information about their health compared to recent Internet users [7].

The results of our study should take into account that the analyzed data refer only to the behavior of users on the Google platform but do not consider information from other search engines. Another fact is the impossibility of associating each user's socio-economic characteristics since the surveys are carried out, and the data is passed on in an entirely anonymous way.

## Conclusion

In the global pandemic of COVID-19, developed countries are looking more for the term "alcohol gel" than middle-income countries. However, the term "washing hands" does not differ in the research volume on the country's socio-economic aspect. In general, developed countries have the highest volume of search for hand hygiene terms compared to middle-income countries. Thus, middle-income countries must create proposals for raising awareness outside the on-line environment so that this information reaches the entire population during the pandemic and can help prevent the decrease in the disease's contagion rates.

## Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

## Conflict of Interest

The authors declare no conflicts of interest.

## Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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