

# A study on implementation and perception of preventive hygiene measures

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## ABSTRACT

The Covid-19 pandemic required the implementation of various preventive hygiene measures to contain the spread of the SARS-CoV-2 virus. Various non-pharmaceutical interventions (NPI) were introduced worldwide. The Covid-19 pandemic has had a significant impact on people's daily lives. Again, relatively simple hygiene measures have proven to be very effective and useful. The main objective of the present study was to find out how people implement the proposed individual prevention measures and how they perceive the administrative measures implemented during the pandemic. The paper presents the results of a web-based, non-representative cross-sectional study conducted between October 15 and November 17, 2020 in Slovenia during the Covid-19 lockdown. The completion of the survey coincided with the peak of the coronavirus pandemic, so it was to be expected that awareness of the importance of hand hygiene as well as other preventive measures was high among respondents. We find that people have changed their hygiene habits during the pandemic. Habits differ both between individual NPIs and between groups of respondents (age, gender and occupational structure of respondents). There are still opportunities to improve knowledge and attitudes towards hand hygiene and to implement all other NPIs.

**Keywords:** Hygiene preventive measures, NPIs, Covid-19, compliance

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## INTRODUCTION

The Covid-19 pandemic, which officially broke out in Wuhan, China, at the end of 2019, has once again shown that we have limited strategies and measures to prevent outbreaks of emerging diseases. The SARS-CoV-2 virus spread from person to person primarily through respiratory droplets and close contact. Non-pharmaceutical interventions (NPI) have been introduced worldwide as public health measures to prevent and/or control virus transmission in the population [1]. Once again, simple hygiene measures have proven to be a very effective weapon in the fight against epidemics. The so-called non-pharmaceutical intervention measures (NPI) include measures at individual, environmental and population level [2]. Physical distancing, respiratory and hand hygiene, face masks, face shields, goggles and gloves are basic prevention measures at the individual level. At the environmental level, cleaning and ventilation can be used. Last but not least, there are preventive measures at the population level, such as limiting close physical interpersonal contact, isolation and quarantine, protecting vulnerable populations, introducing social bubbles, introducing work from home wherever possible, closing non-essential businesses and schools, implementing confinement measures and travel restrictions. Although the implementation of NPIs can have some negative effects on individuals, communities, the economy and the environment [3], their impact in containing the pandemic outweighs their negative effects. To achieve positive results, a multi-level response, including the simultaneous implementation of various hygiene measures, should be implemented [4].

During the global spread of the SARS-CoV-2 virus, numerous studies investigated the effectiveness of hygiene prevention measures [5-8]. In their observational study, Francis et al. [9] reported a correlation between protective measures (face masks, physical distancing, avoiding crowded places and frequent hand washing) and Covid-19 infections. Several studies emphasize the importance of hand hygiene [10], including among healthcare workers [11].

Although the results of several studies support the introduction of preventive hygiene measures and their consistent implementation, inconsistent application and low compliance can unfortunately often be observed in practice. According to Tang et al. [12], individual commitment varies depending on various demographic variables. Individual commitment is an important factor leading to better or worse compliance with all preventive hygiene measures. Although mandatory government measures play an important role in epidemic control, people's behavioral changes cannot be ignored. Duan et al. [13] suggest increasing the population's risk perception to promote the population's adoption of the recommendations for protective measures.

The Covid-19 pandemic has severely affected people's daily routines. Preventive hygiene measures have been taken all over the world (including in Slovenia) to minimize the spread of the virus among the population. The main objective of the present study was to find out how people implement the proposed individual preventive measures and how they perceive the implemented administrative measures during the pandemic.

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## METHODS

The paper presents the results of a web-based, non-representative cross-sectional study conducted between October 15 and November 17, 2020 in Slovenia during the Covid-19 pandemic. The data was collected using an online questionnaire via the 1KA survey tool. Answering the questionnaire was voluntary and the anonymity of the study participants was guaranteed. Respondents completed the questionnaire in around five minutes. The link to the questionnaire was distributed by e-mail and via the social networks Facebook and Instagram. 1,827 respondents clicked on the survey address, 989 started answering, of which 868 completed the questionnaire correctly. The statistical procedures (descriptive statistics and frequency distributions) were carried out using SPSS 20.0 software.

As the survey was conducted during the pandemic lockdown, access to respondents was restricted; therefore, the questionnaire was randomly distributed to respondents. Of the 868 respondents who completed the survey and were included in the further analysis, the majority were women (77.5%), of whom 42.3% were health professionals or students of health-related degree programs. The age structure of the respondents is heterogeneous, with an average age of 29.6 years. Due to the sampling procedure, the sample included in the study is not representative of the Slovenian population (age, gender and professional structure of respondents). Nevertheless, the results give us a very good insight into the population's implementation and understanding of preventive measures during a pandemic and their perception of governance in response to the health crisis.

In the near future, it would be advisable to repeat a similar study with a population-based sample. It is also important to emphasize that the survey results contain self-reported information on hygiene habits. These conclusions should therefore be verified with an observational study in the future.

## RESULTS AND DISCUSSION

The completion of the survey coincided with the peak of the coronavirus pandemic, so it was to be expected that awareness of the importance of hand hygiene and other preventative measures was high among respondents. Basic preventive measures such as hand hygiene were heavily featured in the public media during the coronavirus pandemic. Therefore, several preventive hygiene measures were included in the questionnaire, namely: hand hygiene, self-quarantine, physical distancing, respiratory hygiene and face masks, room ventilation and awareness of government prevention measures.

### Hand hygiene

Although the survey was conducted in the middle of the second wave of the coronavirus pandemic, 6.9% of respondents still do not wash (or disinfect) their hands when they get home, even though the vast majority of them (97.9%) say they wash their hands frequently. More than three quarters of respondents (77.7%) stated that they had already washed their hands when they got home before the pandemic (80.8% of women and 66.7% of men). However, 68.1% (67.8% of women and 69.1% of men) stated that they washed their hands more often after the pandemic than before the pandemic.

G. Jereb

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G. Jereb

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Only 19.1% of respondents know that hands should be clean and dry before using hand sanitizer.

The results show that hand hygiene habits have improved and, more importantly, that the hygiene habits of many people have changed. Morii et al. [14] also reported an increase in hand hygiene compliance among hospital visitors during a pandemic, mainly due to the role of the public media.

More than half of the respondents stated that they had changed their hand washing habits during the pandemic. It seems that more and more people understand the role and importance of hand washing when entering the home environment. Improvements during a pandemic can also be seen elsewhere: Guzek et al. [15] reported improvements in Polish teenagers and Mościcka et al. [16] in Polish women. However, the proportion of participants in our study who reported poor hygiene practices is still too high. Other researchers report similar findings [7, 10].

Although hand disinfection with alcohol before entering the store or other public buildings was mandatory during our study, it is quite interesting that only 54.2% of respondents always disinfected their hands, of which 56.1% were women and 47.7% were men (Table 1). Even fewer respondents reported using alcohol-based hand sanitizer when leaving the store (40.1%, including 42.9% women and only 29.9% men).

Table 1: Frequency of use of alcohol-based hand sanitizers on different occasions

	Never	Rarely	Often	Always
<b>Before entering the store</b>	3.8%	14.1%	27.9%	54.2%
<b>When leaving the store</b>	8.2%	22.2%	29.4%	40.1%
<b>Before entering other public buildings</b>	3.6%	17.2%	31.6%	47.6%
<b>When entering home building</b>	34.3%	39.5%	14.1%	12.1%

The results also show that the respondents' knowledge and attitude towards hand hygiene is rather poor, especially regarding the use of alcohol-based hand sanitizers. Most of them (75.3%) do not know the correct composition of hand sanitizers. Respondents have also rarely (70.8%) checked the composition of the hand sanitizer they use. The majority of respondents are either not well informed or do not know how and when to use hand sanitizer. Only 19.1% of respondents know that hands should be clean and dry before using hand sanitizer. After using an alcohol-based hand sanitizer, a further 14.5% of respondents would dry the alcohol off their hands with a paper towel. The extent of alcohol-based hand sanitizer use is also rather worrying. After the pandemic, only half (50.8%) of respondents washed their hands with soap and water when they got home; everyone else swapped soap and water for alcohol-based sanitizers.

Many respondents (37.3%) also mistakenly believed that their hands were clean for minutes or even hours after using alcohol-based hand sanitizers. Insufficient knowledge was also found regarding the correct use of disposable gloves. Almost a third of respondents incorrectly believed that their hands remained clean after using gloves and did not need to be washed (or sanitised), while almost  $\frac{3}{4}$  of respondents estimated that they did not know how to remove gloves correctly.

### Physical distancing (self-quarantine, isolation, physical distance)

According to the ECDC guidelines (2020), physical distancing includes several measures, including (i) maintaining distance between people, (ii) closing public spaces and public transportation, (iii) closing workplaces and (or) encouraging work from home, (iiii) closing schools (education at all levels), (v) protecting high-risk groups and vulnerable populations, and (vi) isolation (including self-isolation), quarantine and movement restrictions (international or domestic).

The questionnaire contains four questions on physical distancing. The first two questions relate to whether the participants stay at home at the first sign of a cold or in case of illness (self-isolation). In case of illness, the majority of respondents stay at home (82.1% always and 13.9% often), while this is not the case at the first signs of a cold (47.4% always isolate themselves, 34.3% often and 18.3% rarely or never). It is quite alarming that participants with a medical background responded similarly to everyone else and no significant difference was found. The questionnaire also includes participants' perceptions of the use of crowded indoor public spaces. In times of increased respiratory infections, 88.5% always or at least frequently avoid crowded indoor spaces. Only 24.6% of respondents follow the recommendation to maintain social distancing.

### Respiratory hygiene and face masks

Most preventive measures during the Covid-19 pandemic followed the traditional cold warnings. This included respiratory hygiene. In our survey, 71.3% of respondents always consistently adhered to respiratory hygiene recommendations (covering nose and mouth with a disposable tissue when sneezing, coughing, blowing nose and, if no disposable tissue is available, covering nose and mouth with elbow). According to self-reporting, women (74.6%) are better than men (59.5%). Participants with a medical background (80%) are better than others (65%). Worryingly, 28.7% of respondents follow the cough etiquette occasionally, rarely or even never. Tang et al. [12] reported higher compliance to cough etiquette (91.1%) than was measured in our study, while Machida et al. [7] reported similar compliance (58.7%).

Wearing a face mask is another component of respiratory hygiene. It is alarming that many of the respondents wore the mask for several days or even weeks in a row before washing the cloth mask (36.8%) or replacing it with a new mask if it was a disposable mask (42.3%). A significantly higher proportion of respondents with a medical background (32%) used a disposable mask and changed it regularly compared to the others (15%), although 45% of respondents in this group also used a disposable mask for several days. The results suggest that respondents (regardless of medical background) do not believe in the effectiveness of face masks, although several studies have shown that wearing masks can prevent the spread of Covid-19 [17-21].

G. Jereb

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G. Jereb

According to the WHO [22], face masks are not a stand-alone protective measure, but should be used as part of various comprehensive measures to reduce the transmission of respiratory pathogens. In addition, they should be worn correctly and changed regularly. The results of our survey also showed that only 70.7% of respondents knew how to remove the mask from their face correctly. Here too, respondents with a medical background performed significantly better (87%) than respondents without a medical background (60%). As face masks were mandatory at the time of the study, it is rather surprising that 11.1% of respondents stated that they did not or only rarely wear a face mask in closed public places, which is another indicator of mistrust of the mask as a sufficient preventive measure. Face masks are not generally accepted by the public and can do more harm than good if used incorrectly. It would be appropriate to reconsider the current masking policy. A review of masking guidelines is also recommended by Landelle et al. [4].

### Ventilation

For infection control, indoor ventilation is another non-pharmaceutical measure recommended by several institutions, including ECDC [2] and GAeF [23]. Increasing the number of air exchange per hour can reduce the risk of indoor transmission of infectious diseases. As expected, the participants in our study did not ventilate their homes sufficiently. Only 60.7% ventilate thoroughly several times a day, all others ventilate occasionally (31.4%), rarely (6.9%) or even never (1.0%), which applies to all respondents regardless of gender, education or medical background. Tang et al. [12] reported similar compliance with indoor ventilation (54.7%) among their respondents from Taiwan, Japan and North America.

### Perception of government measures

We were also interested in (i) how respondents assessed the course of the pandemic at the time of the survey, (ii) what they thought of the government measures introduced, (iii) to what extent they agreed with the measures implemented (iiii) and whether they felt safe taking the preventive measures (Table 2).

Table 2: Respondents' opinions on the course of the pandemic, preventive measures and fear

	Completely agree		Mostly agree	Neither disagree nor agree	Completely disagree	
	Female	Male	Total			
Current situation regarding the spread of the coronavirus is critical.	40.8%	39.0%	40.4%	36.4%	14.5%	8.7%
Are the current preventive measures too strict?	17.9%	22.1%	18.8%	34.6%	19.6%	27.0%
To what extent do you agree with the preventive measures currently implemented to combat the pandemic?	17.3%	19.0%	17.7%	53.9%	11.6%	16.7%
Adhering to the restrictions and preventive measures makes me feel safe.	17.6%	15.4%	17.2%	45.7%	23.0%	14.1%

It is interesting to note that more than half (53.4%) of respondents believe that the measures introduced are too strict. This is probably one of the reasons for the rather poor implementation of prevention measures at an individual level. 16.7% of respondents do not agree with the proposed measures at all. Nevertheless, the majority of respondents agree that the situation is serious and critical (40.4% completely agree and 36.4% mostly agree). We found no significant differences in the responses in terms of respondents' gender, education or medical background.

## CONCLUSIONS

We can see that people have changed their hygiene habits during the pandemic. However, the knowledge and attitude towards hand hygiene as well as the implementation of all other NPIs can still be improved. Despite the limitations resulting from the sample selection, the results point to the need to educate the population. In addition, and more importantly, new approaches and strategies for NPI implementation need to be developed to improve compliance.

It is important to emphasize that only the combination of different NPIs with high compliance is likely to lead to positive results in future epidemics/pandemics. In addition, basic hygiene measures should be accepted and implemented on a daily basis even during the period when respiratory infections are not occurring.

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G. Jereb

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G. Jereb

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