



# Lifestyle Changes Before and During the COVID-19 Pandemic in West Java Province, Indonesia

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## Abstract

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**BACKGROUND:** West Java is ranked 4<sup>th</sup> as the province with the highest number of COVID-19 cases in Indonesia up to December 1, 2020. The COVID-19 pandemic has a major impact on human health, lifestyle changes, and economic life.

**AIM:** The purpose of this study was to analyze the impact of the COVID-19 pandemic on lifestyle changes among the community of West Java.

**METHODS:** The study was conducted in September 2020 using a cross-sectional study design. A total of 2502 people aged ≥12 years living in West Java were involved in this study as a sample, willing to fill out a questionnaire in the form of a Google form that was distributed online through social media (WhatsApp, Facebook, and Instagram).

**RESULTS:** The results showed that the COVID-19 pandemic had an effect on lifestyle changes in the people of West Java. During the COVID-19 pandemic, the people of West Java became more frequent to wash their hands, do regular exercise, sunbathe in the morning, consume more vegetables and fruits, and consume vitamins or supplements to increase endurance ( $p < 0.05$ ).

**CONCLUSION:** Based on the result, the community should continue to improve the COVID-19 prevention practices in breaking the chain of transmission.

## Background

Coronavirus disease 2019 or COVID-19 is a severe acute respiratory syndrome caused by SARS Coronavirus 2 (SARS-CoV-2) [1]. The Center for Disease Control (CDC) initially identified the cause of COVID-19 as novel beta-coronavirus (2019 nCoV), then the International Committee on Taxonomy of Viruses officially named it Severe Acute Respiratory Syndrome Coronavirus 2 (SARS COV-2) [2]. The COVID-19 outbreak first occurred in Wuhan, Hubei Province, China, at the end of December 2019. On

January 30, 2020, it was declared as a public health emergency of international concern by the World Health Organization (WHO). Then, the COVID-19 disease spread rapidly in the following months, not only in China as the country where the outbreak was found, but also spreading throughout the world [3].

As of December 1, 2020, the total number of COVID-19 cases in Indonesia was 563,680 cases with a total death toll of 17,479. West Java is ranked 4<sup>th</sup> as the Province with the highest number of COVID-19 cases in Indonesia. The number of positive cases of COVID-19 in West Java was 53,395, with a total of 922 deaths [4].

WHO has recommended infection prevention and control efforts that everyone can take to reduce the spread of COVID-19, namely, washing hands, maintaining distance, trying not to touch the mucous membranes of the mouth, eyes and nose, carrying out respiratory protection and hygiene measures using masks, carry out identification of infected personnel and contact tracing, and the last is travel restrictions [2]. Those efforts are expected to be followed by everyone to prevent spreading of COVID-19 in this pandemic.

The rise of COVID-19 to pandemic status has affected everything. The COVID-19 pandemic does not only have implications for the health sector, but also various sectors, such as the economy, social and politics, even the impact are not only felt by large countries but almost all countries in the world [5]. The high rate of spread of COVID-19 can even cause behavioral changes in humans, such as eating habits [6]. Other human behavior may also be affected by this pandemic because currently, the topic of COVID-19 is a big part of the world agenda [6]. The Indonesia Government has even called on the Indonesian people to live in peace with the coronavirus and lead a new normal life. However, the application of life in this new normal era needs to be accompanied by improvements in implementing healthy living behaviors [7]. With this appeal from the Indonesian Government, it should be able to increase public awareness to change their lifestyle for the better.

Several previous studies have shown that the COVID-19 pandemic has had an impact on changing the lifestyle of people in various countries. The results of the research conducted by Atmadja *et al.* and Utama *et al.* in Indonesia showed that after the COVID-19 pandemic occurred, people became more often sunbathing in the morning as an effort to prevent infection from the disease [8], [9]. Research conducted by Muto *et al.* in Japan proves that the majority of respondents wash their hands more frequently after the COVID-19 epidemic [10]. Hand washing with soap under running water is a key intervention for preventing the spread of COVID-19 [11]. Research conducted by Di Renzo in Italy revealed that there are differences in exercise habits among the Italian population before and after the COVID-19 pandemic. They are exercising more frequently after the pandemic [1]. Research conducted by Yilmaz in Turkey showed that after the pandemic, respondents were more likely to increase their consumption of water, vegetables, fruits, meat, chicken, fish, and milk and their processed products. The change in eating behavior was because they realize the importance of improving nutrition which has the benefit of increasing their immunity [6]. The objective of this study was to analyze the impact of the COVID-19 pandemic on lifestyle changes among the community of West Java.

## Methods

A cross-sectional study was conducted in this study in September 2020. The population of this study was residents of West Java Province aged  $\geq 12$  years. The accidental sampling technique was developed in this study through sampling by distributing questionnaires online (Google form) through WhatsApp, Instagram, and Facebook, to obtain a sample of 2502 people who were willing to fill out the questionnaire. This research has obtained ethical approval from the Research Ethics Commission Mataram Health Polytechnic with letter number: LB.01.03/1.1/3016/2020.

Questionnaire that has been prepared in advance was tested for validity and reliability. Calculation results obtained with Cronbach's  $\alpha = 0.831$ . These results prove that the questionnaire used has met its validity and reliability.

The independent variable consists of the COVID-19 pandemic and while the dependent variable is the lifestyle of the West Java population including the habit of sunbathing in the morning, exercise habits, hand washing habits, the habit of consuming vegetables and fruits, and the habit of taking supplements to increase body immunity. The variables were measured through questions questionnaire regarding how often the population of West Java does this habit before it occurs before and during the pandemic. The question has four options or categories, namely, never, rarely, often, and always. Respondents who belong to the respondent group have "never" had the habit of sunbathing, exercising, washing hands, consuming vegetables and fruit, taking supplements if within a week the respondent has never practiced this lifestyle. Respondents are included in the group that "rarely" if within a week the respondent applies the lifestyle or habit  $< 3$  times. Respondents are included in the "often" group if within a week the respondent practices this habit  $\geq 3$  times. Meanwhile, the respondents who were included in the group if the respondent "always" apply it every day. To make it easier for bivariate analysis processing, each of the variables grouped into two categories, namely, never-infrequently and frequently. After the data is collected, data processing was carried out by including editing, coding, processing, and cleaning activities.

Furthermore, the data analysis processing was carried out by including univariate and bivariate analysis. The purpose of the univariate analysis is to see the frequency distribution of each of the studied variables. Chi-square test performed in analyzing data in a bivariate manner. The variables studied in this study were categorical, so the Chi-square test was used to analyze the difference in the proportion of life style between before the COVID-19 pandemic and during the COVID-19 pandemic.

## Results

The following are the results of the study covering the characteristics of the respondents, the results of univariate analysis and bivariate analysis.

Table 1 shows that most of the respondents were  $\geq 21$  years old (52.7%). Most of the respondents were women (74.5%) and graduated from high school (65.55).

**Table 1: Demographic characteristics of respondents**

Variable	Frequency	Percentage
Age		
<21 years old	1,183	47.3
$\geq 21$ years old	1,319	52.7
Total	2,502	100.0
Sex		
Male	638	25.5
Female	1,864	74.5
Total	2,502	100.0
Education		
Graduated from elementary school	15	0.6
Graduated from junior high school	76	3.0
Graduated from senior high school	1,615	64.5
Graduated from college	796	31.8
Total	2,502	100.0

Based in Table 2, it was known that there was an increase in the proportion of respondents who sunbathe in the morning to become more frequent after COVID-19 pandemic with a percentage of 25.2%. The proportion of respondents who exercised more frequently or regularly increased by 15.5%. The proportion of respondents who wash their hands more frequently also increased by 22.0%. The proportion of respondents who consume vegetables and fruit more frequently during the pandemic has increased by 7.9%. Likewise, the proportion of respondents who had the habit of taking supplements more frequently during the pandemic increased by 23.4% (Table 3).

**Table 2: Life style changes of participants during the COVID-19 pandemic in west Java Province**

Variable	Increased		Not changed		Decreased	
	n	%	n	%	n	%
Sunbathing habits	632	25.2	1,838	73.5	32	1.3
Regular exercise habits	389	15.5	1,961	78.4	152	6.1
Hand washing habits	550	22.0	1,938	77.4	14	0.6
Vegetable and fruit consumption habits	197	7.9	2,265	90.5	40	1.6
Supplement consumption habits	586	23.4	1,885	75.4	31	1.2

The results of the bivariate analysis showed that there was a significant difference in the proportion of respondents who had the habit of often sunbathing in the morning before and during the pandemic. ( $p = 0.0001$ ). As well as the other variables, this study proved that the proportion of respondents who exercised regularly differed significantly between before and during the pandemic ( $p = 0.0001$ ). The proportion of respondents who consumed vegetables and fruit between before and during the pandemic was significantly different ( $p = 0.0001$ ). The proportion of respondents who consumed supplements to increase immunity was significantly different between before and after the pandemic ( $p = 0.0001$ ).

**Table 3: Differences in lifestyle before and after the COVID-19 pandemic in west Java Province**

Variable	n	Before %	n	During %	OR	95%CI	p-value
Sunbathing habits							
Never-infrequently	1,999	79.9	1,399	55.9	31.8	21.9–46.1	0.0001
Frequently	503	20.1	1,103	44.1			
Regular exercise habits							
Never-infrequently	1,763	70.5	1,526	61.0	13.6	11.0–16.8	0.0001
Frequently	739	29.5	976	39.0			
Hand washing habits							
Never-infrequently	707	28.3	171	6.8	36.3	20.8–63.3	0.0001
Frequently	1,795	71.7	2,331	93.2			
Vegetable and fruit consumption habits							
Never-infrequently	638	25.5	481	19.2	102.1	71.5–145.6	0.0001
Frequently	1,864	74.5	2,021	80.8			
Supplement consumption habits							
Never-infrequently	1,918	76.7	1,363	54.5	40.5	27.8–58.9	0.0001
Frequently	584	23.3	1,139	45.5			

## Discussion

The COVID-19 pandemic has stimulated the Indonesian people to change their lifestyle, especially since the Indonesian government implemented the new normal policy. The public is encouraged to be disciplined in implementing health protocols and increasing body immunity. Research conducted by Tuppal *et al.* [12] has confirmed that public knowledge has a correlation with COVID-19 prevention practices in the Philippines. At the beginning of the pandemic, the Philippine Department of Health continued its outreach campaign on the importance of washing hands, covering nose, and mouth when coughing and sneezing, using sanitizers, using face masks, avoiding finger contact with mouth, nose, and eyes. These efforts are made so that the Filipinos people have good knowledge and high awareness to carry out COVID-19 prevention practices.

The results of this study indicated a significant increase in the proportion of respondents who often sunbathe in the morning before and during the pandemic. A research conducted in Indonesia which involved 6557 respondents, stated that some respondents (67.7%) rarely and always do sunbathing activities during the COVID-19 pandemic [8]. Likewise, research conducted in East Nusa Tenggara stated that as many as 23.56% of the people always do sunbathing activities and 47.64% rarely do it to increase immunity or activate it [9], [13]. This could happen because of the large amount of information obtained by the public regarding the prevention of COVID-19 both through pt media, internet media, and other mass media. Various intervention through the medium of the internet and information technology has the potential to help individuals both patients suspect COVID-19 and the general public to change behavior to improve physical, mental, and behavioral health. In particular, social media interventions have several advantages, including broad accessibility that can cross geographic barriers that can reach distance boundaries and cost efficiency [14].

The benefits of sunbathing to obtain sun exposure have proven through several studies, one of which is by Slusky and Zeckhauser which stated that the sun triggers the production of Vitamin D which functions to increase the immune system. Sun exposure to the skin which contains ultraviolet rays, especially ultraviolet B, is an effective way to synthesize Vitamin D from previtamin D, which is already under the surface of human skin. Vitamin D increases the natural immunity to the cell by inducing antimicrobial peptides which include human cathelicidin, LL-37, 1,25 dihydroxy Vitamin D, and defensins [15]. Cathelicidin plays a role in directly inhibiting microbial activity include viruses, bacteria, and fungi [16]. That is also proven by Cannell *et al.* that ultraviolet radiation (both from artificial rays and sunlight) can reduce the incidence or incidence of viral infections in the respiratory tract as well as codfish oil which both contain Vitamin D [17]. However, the habit of sunbathing also has an impact on the health of the skin which is an increase in skin pigmentation such as skin color darker, the appearance of spots/black spots, skin surface that is more rough and dull, and emersion of more wrinkles [18].

This study found that the proportion of respondents who exercise regularly has increased significantly during the COVID-19 pandemic. The results of previous research conducted by Di Renzo revealed that there were significant differences in the frequency of exercise performed by respondents ( $p < 0.001$ ). During the pandemic, respondents exercised more often because they had more time to do it at home, whereas before the pandemic, they could only exercise occasionally [1]. The increase in people's habits in exercising is in line with research conducted by Hadi, during the COVID-19 pandemic, the majority of people in Malang city do cycling sports 3–5 times a week [19]. This finding is supported by the results of a study developed by Brand *et al.* which states that 31.9% of respondents reported an increase in the frequency of their exercise during the coronavirus pandemic. Of those who exercised during the pandemic, 9.1% had a higher intensity of exercise. Furthermore, 24.5% reported exercising with a longer duration [20].

The COVID-19 pandemic provides a stimulus for each individual to be more vigilant so as not to infect the disease. Various preventive efforts have been made both in individual, group, and community settings. A few prevention efforts at individual arrangements are increasing endurance. Under normal conditions, the human body has a defense system to prevent and fight germs that enter the body. If a person's immune system is in good condition, it affects health condition to be maintained well. To increase endurance, one of the efforts made is by doing sports. Based on research conducted by Sukendra, it was known that light physical exercise can be helpful in immune function. The immunity could be improved by physical exercise/sports. The exercise habits carried out by

respondents are one of the individual responses to prevent COVID-19 transmission [21].

Saputra (2020) in his research stated that exercise would increase body immunity was an exercise that must meet the criteria of frequency, intensity, time, and type. From the terms of frequency, should be done between 3-5 times a week. The types of exercise that can be done include exercising that is not done in public places such as using a stationary bicycle, walking/jogging, and aerobics that are carried out according to ability [22]. The effect of regular exercise is much better against the system immune when compared with exercising that is only done once only. Exercise could stimulate the performance of antibodies and cells of the blood of white could circulate more quickly. Cells blood white is the cell immunity of the body that fight various disease [23].

The results of this study indicated that there were a significant difference ( $p < 0.05$ ) in the people's hand washing habits between before and during the COVID-19 pandemic. During the COVID-19 pandemic, people wash their hands more frequently than before. This result was in line with previous research conducted by Atmadja *et al.* [8] and Yunianto *et al.* [24] which showed that people always wash their hands with soap during a pandemic. A study in Japan demonstrated that most respondents in their study washed their hands more frequently after the pandemic (86%) [10]. A research conducted by Moore *et al.* showed that the average hand hygiene performance (HHP) rates increased from 46% to 56% in the early months when the pandemic occurred before the policy to do schooling from home was implemented [25]. This indicated that people have the awareness to improve hand hygiene during a pandemic.

Washing hands using soap are one of the prevention efforts in the spread of Covid-19, our hands are important media for the transmission of microorganisms [26]. Therefore, hand hygiene has been recommended as an important strategy to help prevent the transmission of COVID-19 [25]. Soap can clean dirt and kill germs, because, without soap, dirt, and germs are still left on the hands. The benefits of washing hands alone are to cleanse the hands of germs of disease; and prevent the transmission of diseases such as diarrhea, cholera, dysentery, typhoid, intestinal worms, skin disease, and acute respiratory infections (ARI) [27]. Therefore, hand washing habit should be retained in an attempt application of force to live healthy in comply with the protocol of health in the community.

The vegetable is an ingredient of food sources of vitamins and minerals that are important in maintaining health and immune body [28], [29]. The result of this study demonstrated that during the pandemic, West Java society consumes fruits and vegetables more often than before the pandemic. This result was under accordance with the previous research that showed

good changes in the behavior of a society that is to eat vegetables more often [8], [30], [31]. Vegetables are an ingredient of food sources of antioxidants that can improve health [32]. Antioxidants serve as an increase in power to hold the body or maintain the immunity of the body [33]. Vegetables have a wide variety of colors which are an indicator of antioxidant content [34], [35]. Food components that contain very high antioxidants include Vitamin C, Vitamin E, and phytochemicals such as carotenoid and polyphenols [33], [35], [36]. The content of antioxidants is high serves as an anti-inflammatory and may reduce oxidative stress that can strengthen the immune system [33], [36], [37].

This study proved that there is a significant increase in the proportion of the population who frequently take supplements before the pandemic and during the pandemic occurs. A supplement is addition food usually in the form of micronutrients such as vitamins and minerals. The supplement is also a source of antioxidants that can improve the power resistant body or immunity [38], [39]. West Java people's supplement consumption has a significant relationship to conditions before and after the pandemic. The level of supplement consumption for the people of West Java has increased. It is different from the research before that shows at the time of the pandemic, the level of consumption supplements did not affect significantly. Supplements are not a factor in preventing COVID-19 transmission [40]. However, supplement such as Vitamins C and D, as well as zinc and selenium are a supplement that is a potential that air benefits for individuals at risk, respiratory viral infections, or those who lack the nutrients [41].

## Conclusion

There have been significant lifestyle changes between before and during the COVID-19 pandemic. During the COVID-19 pandemic, the people of West Java, in general, had a healthier lifestyle change. This is evidenced by the fact that during the COVID-19 pandemic, people maintain personal hygiene by washing their hands more often. In addition, people often do exercise regularly so that the body becomes fit and the body's metabolic process becomes more leveraged. The habit of sunbathing in the community increases the body's immunity through the role of Vitamin D. Consumption of vegetables and fruit is good during the COVID-19 pandemic. Vegetables and fruits contain vitamins and minerals to maintain the immune system. Taking supplements can help fill gaps in nutrient intake that may not be obtained from fresh foods. Taking supplements as an anticipatory plan to maintain immunity during a pandemic is a natural step and is relatively cheaper and easier for most people. Based on these results, the researchers suggest that the community

continues to improve the practice of preventing COVID-19 from breaking the chain of transmission. This requires support from the government in promoting a healthy lifestyle during the COVID-19 pandemic.

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