

# The Effect of the Covid-19 Pandemic on Changes the Eating Habits of the Community in Bogor

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**Abstract.** The aim of this study was to determine the effect of the COVID-19 pandemic on changes in eating habits is a quantitative study with a cross-sectional design conducted in Bogor with 110 respondents. Changes in eating habits observed include changes in eating frequency, meal portions, frequency of fruit consumption, frequency of vegetable consumption, frequency of snack consumption, frequency of consumption of fast food/frozen food, and consumption of supplements. Respondents were more women (83,6%), adult age group (89,1%), higher education (79,1%), work (61,8%), income > IDR 4,000,000 (75,5%). The results of the univariate analysis related to changes in eating habits consist of: changes in eating frequency (69,1%), changes in food portions (56,4%), changes in fruit consumption frequency (61,8% more often), changes in vegetable consumption frequency (63,6% more often), changes in the frequency of snack consumption (more often 74,5%), changes in the frequency of consumption of fast food/frozen food (more often 70%) and consumption of supplements (90,9%). The results of the bivariate analysis are showed that changes in eating frequency were significantly related to income; changes in meal portions were significantly related to education and expenditure; changes in the frequency of vegetable consumption are significantly related to income; changes in snack consumption frequency were significantly related to age, gender, occupation; changes in the frequency of consumption of fast food are significantly related to gender and consumption of supplements was significantly related to age. Suggestions for the research are needed to consistently educate about good and correct food habits so that more people understand and apply them to increase immunity and data collection will be better with direct interviews and fill out the FFQ of the food consumed.

**Keywords:** Covid-19 pandemic, changes in eating habits, influence

## 1 Introduction

The COVID-19 pandemic causes many changes in daily life. Almost all areas of life are affected by the Covid 19 pandemic. According to the Indonesian Ministry of Health (2020), Coronavirus is a large family of viruses that cause disease in humans and animals. It usually causes respiratory tract infections in humans, ranging from the common cold to serious illnesses such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). A new type of coronavirus found in humans since an extraordinary event appeared in Wuhan, China in December 2019, was later named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV2), causing Coronavirus Disease-2019 (COVID-19). The spread of the virus was so fast that it caused this outbreak to be designated a pandemic by the World Health Organization (WHO) on March 11, 2020 [7].

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Everyone has the opportunity to be infected with COVID-19. This disease can spread through small droplets from the nose or mouth when coughing or sneezing. A person can become infected with COVID-19 when accidentally touching and inhaling droplets from an infected person. This is why it is crucial to maintain a distance of at least one meter from sick people. Experts are still conducting investigations to determine the source of the virus, the type of exposure, and the mode of transmission [7].

The Covid-19 (Coronavirus) pandemic has caused many changes in daily life including the establishment of various policies to reduce the spread of Covid-19. Some of these policies include implementation physical distancing, hand washing as health protocols, or carrying out several other strict policies such as limiting an activity such as work or school [6]. Some countries even lock down an area, so that the spread of the virus can stop [19].

One of the effects is the eating habits of a person or society and affects the amount of household spending, especially related to food. Eating habits are a human behaviour or a group of humans in meeting their food needs, include attitudes, beliefs and food choices. Attitudes towards food can be either negative or positive depending on the values in which a person or group of people grew up. Food quality will be related to good or bad, attractive or unattractive food. These attitudes and beliefs will ultimately affect the choice of food [11]. Ramanian, *et..al* (2021) stated that 58.2% of students consumed more food and 82.5% of them consumed snacks that were low in nutritional content [17].

The COVID-19 pandemic has greatly affected people's attitudes and beliefs about the function of food, thus affecting the choice of food to be consumed. The household's food security condition is also disrupted during this Covid 19 period. People who are economically capable will give more attention to the kind of food consumed related to nutritional fulfillment to increase body resistance. Nutrition is the link between food and health. Food is related to every aspect of human life, including culture, gender, physical work, education, and the environment. In the end, it will affect the health of individuals and populations. Maintaining a healthy diet is very important during the Covid-19 pandemic. Although there is no food or dietary supplement that can prevent Covid-19 infection, maintaining a healthy balanced nutritional diet is very important in boosting the immune system [10].

Changes in eating habits related to the COVID-19 pandemic include changes in the number of meals in a day, the amount of food consumed, the variety of food consumed, breakfast habits, the habit of cooking their own food and trying new recipes, the habit of consuming organic food, the habit of consuming fruit and vegetables, habits consuming herbal drinks (empon-empon), and the habit of choosing to eat at home. Changes in eating habits were followed by other changes, including changes in the location and method of purchasing groceries, the priority of the food purchased and the amount of expenditure for groceries.

The results of research [18] with 200 respondents in the study show knew that 62.5% had changed their eating habits and experienced an increase in the diversity of food consumption by 59%, as many as 76% of respondents tended to make empon-empon (spices) as drinks during the pandemic Covid-19. The most widely used type of spice was ginger, as much as 44%, followed by orange/lemon and turmeric. Respondents who experienced an increase in the frequency of eating were 54,5% and the amount of food consumption increased by 51%. Respondents experienced an increase in body weight of 54.5%, and respondents were also not concerned about lack of food, which was 54.5% higher than those who were worried about food shortages as much as 44.5%.

Saragih [18] also showed the relationship between several factors related to eating habits there are changes in eating habits with age, diversity of food with the type of work, breakfast habits with type of work, variety of consumption with changes in eating habits and frequency of eating during the COVID-19 pandemic with respondents weight gain. The unrelated factors include the diversity of consumption with fear of lack of food, breakfast habits with fear of lack of food, drinking empon-empon with eating frequency and types of empon-empon with weight gain.

## 2 Research Methodology

This research is quantitative research using a cross-sectional research design. The research variables were observed simultaneously and taken when the research was in progress, including the respondents's characteristics (independent variables) and changes in eating habits (dependent variables) [8].

Characteristics of respondents include age, gender, education, occupation, number of family members, income, and expenses. Changes in eating habits include changes in eating frequency; change in meal portions; changes in the frequency of consumption of fruit, vegetables, snacks/snacks, fast food/fast food and consumption of supplements. The criteria for the respondents selected were living in Bogor, aged >17 years, already working, not having physical limitations and providing complete data related to the study. Based on these criteria, the Bogor community who became respondents in this study were 110 people.

The stages of the research were proposal preparation, research preparation, questionnaire creation, questionnaire distribution, data collection, data processing and research report preparation. The research location in Bogor (Bogor City and Bogor Regency). Research respondents spread across Bogor are West Bogor, Central Bogor, North Bogor and South Bogor. The purpose of this study was to produce informative data in the form of an overview of changes in people's eating habits in Bogor during the Covid-19 pandemic.

The data in this study were obtained from filling out the questionnaire. The questionnaire used a google form, and respondents filled it from the link that is informed to them. The questionnaire consisted of questions related to the identity of the respondents, anthropometric data and eating habits. Questions related to respondent data include name, gender, age, address, cellphone number, number of family members, education and occupation. Questions related to anthropometric data were weight, height and changes in body weight. This anthropometric data can give information about respondents nutritional status [20].

Questions related to eating habits before and during the Covid-19 pandemic included eating frequency, menu patterns, meal portions, fruit consumption, vegetable consumption, snack consumption, consumption of fast food/frozen food, consumption of snacks and supplements. This questionnaire is filled out directly by the respondent without direct monitoring when they fill it so that each main question will be followed by other questions to support the answer to the main question. For example, questions related to eating frequency have one main question, there are questions related to changes in eating frequency during the covid-19 pandemic. To support the answer for this question, other questions arise about the frequency of eating before the Covid-19 pandemic, the form of changes that occur in addition or subtraction frequency of eating, the number of frequencies before and during the Covid-19 pandemic. The same was done for the other questions.

The data obtained from the results of filling out online questionnaires (google forms) by respondents will be processed and analyzed so it can provide information related to changes in people's eating habits in Bogor during the Covid-19 pandemic. Data analysis carried out in this study was univariate analysis and bivariate analysis. Data analysis using statistical processing software.

Bivariate analysis was used to determine the relationship between the independent and dependent variables. This research used chi square test ( $X^2$ ) because each variable was a categorical type of data [8]. The chi square test ( $\chi^2$ ) in this study used a significance degree of 95% ( $\alpha = 5\%$ ). If the statistical test results get a p value < 0.05 that means there is a significant relationship between the two variables. If the p value > 0.05 that means there is no significant relationship between the two variables.

The research hypothesis of this research is that the Covid-19 pandemic affect changes in eating habits based on the relationship between the factors observed with the results that age, gender, education, occupation, number of family members, income and outcome have a relationship with changes in respondents eating habits during the Covid-19 pandemic.

### **3 Results and Discussion**

The results of the study consist of the description of the respondents, the results of the univariate analysis (the description of changes in eating habits) and the results of the bivariate analysis. The description of respondents in this study includes age, gender, education, occupation and income, which can be seen in Table 1.

In data processing, age is divided into two categories: adults and the elderly [3]; work is divided into two categories there are not working and working; income is divided into 2 categories there are < 2,000,000 and > 2,000,000, while gender and education data use the same category.

Table 1. Frequency distribution of age, gender, education, occupation and income of the people in Bogor during the Covid-19 Pandemic

Research Variables	n	(%)
<b>Age</b>		
Early adulthood (26 – 35 years old)	42	38.2
Adult (36 – 45 years old)	56	50.9
Elderly (46 – 55 years old)	12	10.9
<b>Gender</b>		
Male	18	16.4
Female	92	83.6
<b>Education</b>		
Basic Education	2	1.8
Middle Education	21	19.1
High Education	87	79.1
<b>Occupation</b>		
Housewife	40	36.4
Businessman	9	8.2
Private employees	14	12.7
civil servant	14	12.7
Etc.	31	28.2
unemployment	2	2
<b>Income (IDR)</b>		
0 – 2.000.000	12	10.9
>2.000.000 – 4.000.000	15	13.6
> 4.000.000 – 6.000.000	20	18.2
> 6.000.000 – 10.000.000	30	27.3
> 10.000.000	33	30.0

Univariate analysis for data on changes in food habits during the Covid-19 pandemic consists of changes in eating frequency, changes in meal portions, changes in the frequency of fruit consumption, changes in the frequency of vegetable consumption, changes in the frequency of snack consumption, changes in the frequency of fast food/frozen consumption and consumption of supplements which can be seen in Table 2.

Table 2. Results of Univariate Analysis of Changes in People's Eating Habits in Bogor during the Covid-19 Pandemic

Research Variables	n	(%)
<b>Changes in eating frequency</b>		
Increased Frequency of Eating	58	52.7
Reduction in Eating Frequency	18	16.4
Not changed	34	30.9
<b>Changes in meal portions</b>		
Changed	62	56.4
Not Changed	48	43.6
<b>Changes in the frequency of fruit consumption</b>		
Increased Frequency	68	61.8
Not Changed	42	38.2
<b>Changes in the frequency of vegetable consumption</b>		
Increased Frequency	70	63.6
Not Changed	40	36.4
<b>Changes in the frequency of snack consumption</b>		
Increased Frequency	82	74.5
Not Changed	28	25.5
<b>Changes in the frequency of fast food/frozen consumption</b>		
Increased Frequency	77	70.0
Not Changed	33	30.0
<b>Consumption of Supplements</b>		
Yes	100	90.9
No	10	9.09

Based on Table 2, it is known that most of the respondents experienced a change in the frequency of eating, which consists of adding and reducing the frequency of eating that the percentage of increasing the frequency of eating was higher than the others. This is because the COVID-19 pandemic gives people more time to consume delicious and nutritious food at home to increase immunity [15]. The increase in the number of servings of food consumed is also very high. Increase in food portions was also followed by an increase in food consumption with a complete menu consisting of staple foods, side dishes (animal and vegetable), and vegetable dishes complemented by fruit. A small number of respondents only consume staple foods, side dishes (animal and vegetable) and vegetable dishes without fruit. These results show that respondents know the importance of balanced nutrition to meet nutritional needs during the Covid-19 pandemic. The same results were stated by Jumalda, *et al.*, (2021) that there was a change in eating habits between before and during the Covid-19 pandemic, which was shown by the majority of respondents experiencing a change in eating habits become more regular and balanced diet, especially those with Covid-19 cases in their surroundings [9].

The change in eating habits that also occurred during the Covid-19 pandemic was increase of fruit and vegetables consumption frequency around 60-70% of respondents more often during the Covid-19 pandemic than before the Covid-19 pandemic. Increase of fruit and vegetables consumption frequency about 3-9 times/day for vegetables and 3-9 times/week for fruit. Fruits and vegetables contain many vitamins and minerals that are very useful for the body's resistance, so respondents increase the frequency of fruits and vegetables. The same results were stated by Dieny, *et al.*, (2021) that subjects experienced changes in eating habits, namely an increase in the frequency, variety, and portion of consumption of animal protein, vegetable protein, vegetables and fruit between before and during the COVID-19 pandemic ( $p < 0,001$ ) [5].

The results of this study are also in line with research conducted by Ruiz-Roso, *et al.* (2020) there are 820 adolescents in several countries. The study showed significant differences in vegetable and fruit consumption between before and during the Covid-19 pandemic [16]. The results of another study in China also showed that 40% of research subjects experienced increased consumption of vegetables and fruit [15]. However, a study in France showed the opposite result, where there was a decrease in consumption of fresh food products, especially fruit and fish, during the pandemic [4].

Changes in the frequency of snack consumption also occurred in respondents, and the snack consumption frequency became more often during the Covid-19 pandemic. The types of snacks consumed are very diverse and include dry foods, sweet and salty cakes (cake, sponge cake, cireng, spring rolls), chocolate, side dishes (meatballs, dumplings). The application of the work from home system causes respondents to have a lot of time at home so that respondents have a lot of time to provide snacks or buy online. The same results were stated by Ramanian, *et al.*, (2021) that 82.7% subject know that they consume snacks that are considered low in nutritional value [17].

Fast food/frozen food consumption frequency also becomes more often in a week. Fast food/frozen food is consumed by respondents as a companion to staple food and as a snack. Fast food/frozen food is considered more practical, especially for respondents who rarely cook their food. The results show that 47% of people now have the habit of eating processed foods that are considered more practical. Meanwhile, 36% of other respondents admitted that they consume food from crops less frequently, and 26 % of people rarely eat meat or poultry [21]. The research result by Ammar, *et al.*, (2020) there is an increase in eating habits during the pandemic and tends to lead to an increase consumption of snacks and fast food, which of course is very dangerous for the health of the human body [1].

The majority of respondents (90.9%) carried out the habit of consuming supplements to increasing immunity in the face of the Covid-19 pandemic. Supplements consumed include multivitamins, herbs, empon-empon drinks and so on. Saragih [18] showed that 76% of respondents tend to make empon-empon (spices) as drinks during the COVID-19 pandemic. The most widely used type of spice was ginger, as much as 44%, followed by orange/lemon and turmeric. The habit of consuming fluids, supplements, and spices also experienced a significant increase, while the pattern of snacking decreased between before and during the pandemic ( $p < 0,001$ ) [5].

The COVID-19 pandemic has caused various changes, including changes in eating habits. Respondents experienced changes in eating habits as many as 125 people (62,5%), and the remaining 75 people (37,5%) did not experience changes in eating habits. Changes in eating habits can be caused by respondents working from home, so they are more regular in eating, and there is an increase in food diversity [18].

Bivariate analysis was carried out between the variables of changes in eating habits with age, gender, number of family members, education, occupation and income during the Covid-19 pandemic. The results of the bivariate analysis between the dependent and independent variables can be seen in Table 3.

Table 3. Results of Bivariate Analysis for Interrelated Variables

No	Research Variables		Chi-Square Test (P-Value)
	Dependent	Independent	
1	Changes in eating frequency	Income	0,021
2	Changes in meal portions	Education	0,038
3	Changes in the frequency of vegetable consumption	Income	0,045
4	Changes in the frequency of snack consumption	Age	0,01
5	Changes in the frequency of snack consumption	Gender	0,009
6	Changes in the frequency of snack consumption	Occupation	0,039
7	Changes in the frequency of fast food/frozen food consumption	Gender	0,043
8	Consumption of Supplements	Age	0,009

Description: \*p-value  $\leq$  0.05 there is a significant relationship

Based on Table 3, it is known that income has a significant relationship with changes in eating frequency and changes in vegetable consumption frequency. This can happen because the amount of income will affect the power/ability to buy food for daily consumption, including buying vegetables which are one of the components in the main/complete dish.

Education has a significant relationship with changes in food portions. This can happen because most of the respondents are highly educated and quite exposed to efforts to prevent Covid-19. One of the efforts made is the consumption of food in sufficient types and quantities so that respondents who usually do not eat at regular times and portions will change to eating at times with more portions than usual for increasing body resistance to prevent being exposed by Coronavirus.

During the Covid-19 pandemic, the portion of food consumed by a person is mostly increases from the previous condition. This is because most activities are carried out at home, so boredom will arise, especially for people who are used to their time for activities outside the home. Food is one way of diverting boredom. The portion of the meal means main meal or side dish or snack.

Age has a significant relationship with changes in the frequency of snack consumption and changes in supplement consumption. Based on the identity data of the respondents, it is known that most of the respondents are working adults. During this Covid-19 pandemic, many activities are carried out at home, and all family members gather so that complete meals and snacks will be more than normal days. They do that to avoid purchasing food from outside the home. Adults and the elderly are the group that is quite vulnerable to the coronavirus; therefore most of the respondents take supplements (multivitamins, herbs, empon-empon) as an effort to increase endurance.

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Empon-empon is a herbal drink made from mix of various spices. Herbs has been shown to increase immunity [18]. Some of these herbs include Brotowali (*Tinospora cordifolia*), Aloe Vera (*Aloe vera*), Mulberry (*Morus alba*), Lime (*Citrus aurantifolia*), Garlic (*Allium sativum*), Turmeric (*Curcuma longa*), Red Ginger (*Quercetin*), Temulawak (*Curcuminoid*), Gotu Kola (*Centella*

*asiatica*), ginseng (*Panax ginseng*), and so on [2, 12, 14]. Consumption of spices/herbs may be able to improve the immune system and protect the body from COVID19.

Gender has a significant relationship with changes in snack consumption frequency and changes in fast food/frozen food consumption. Most of the respondents in this study were women who preferred to consume snacks. The Covid-19 pandemic has caused many people to avoid buying ready-made food from outside. For respondents who rarely cook at home, buying fast food and frozen food is practical and easy [15]. The results of research by Noviasy and Susani (2020) showed different results that the increasing frequency of cooking at home causing a decrease in the frequency of fast food consumption [13]. There are 65.63% of respondents reduce consumption of fast food during the Covid-19 pandemic [13].

Work has a significant relationship with changes in the frequency of snack consumption. Most of the respondents in this study worked. The COVID-19 pandemic has led to the implementation of work from home, which opens up opportunities to work more casually and consume snacks that they like. Especially the respondents in this study were many women who really liked to consume snacks.

## 4 Conclusions

Based on research on the effect of the Covid-19 pandemic on changes in eating habits, it can be concluded that:

1. Most of the respondents belong to the adult age group (89,1%), female (83,6%), highly educated (79,1%), most of the work (61,8%) and with income > IDR 4 million/month.
2. Changes in eating habits observed include changes in eating frequency (69,1% change); changes in meal portions (56,4% change); changes in the frequency of consumption of fruit (61,8% more often), vegetables (63,6% more often), snacks (74,5% more often), fast food (70,0% more often); and consumption of supplements (90,9% consume the supplements)
3. Results of the bivariate analysis showed the relationship between changes in eating frequency with income; changes in food portions with education; changes in the frequency of vegetable consumption with income; changes in the frequency of snack consumption with age, gender and occupation; changes in the frequency of consumption of fast food/frozen food with gender; consumption of supplements with age.

## 5 Recommendations

Recommendations for this research are:

1. Education on good and correct food habits must be carried out consistently to make more people understand and apply it, and ultimately it increases each person's body resistance.
2. Data collection would be better if completed with direct interviews with respondents and filling out FFQ related to the frequency of food consumed to be more detailed.

## 6 Acknowledgments

The authors want to thank College of Vocational Studies IPB University and all participants in this study.

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