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Dietary Habits by Income Level during the COVID-19 Pandemic in Indonesia: Results from the IndoNutriLifeCOVID-19 Online Survey

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Abstract

BACKGROUND: The coronavirus disease 2019 (COVID-19) has caused many lifestyle changes, especially in the diet. Policies such as physical distancing and quarantine orders aimed to mitigate to spread of COVID-19 have affected the economy and, therefore, the dietary habits of the people.

AIM: The purpose of this study was to analyze the associations between income levels and dietary habits during the COVID-19 pandemic.

METHODS: This cross-sectional study included 697 Indonesian adults from various regions in Indonesia. The study was conducted from June to August 2020. Data were obtained through a self-administered online questionnaire including dietary habits, lifestyles, and quality of life data adapted from MyNutriLifeCOVID-19 online survey. To analyze the associations between income levels and dietary habits during the COVID-19 pandemic, a Chi-square test was used. Data were analyzed using SPSS version 20.

RESULTS: Respondents had mean age of 27.56 ± 8.58 years and the majority were women (83.6%). The percentage of people with large-scale social restrictions was 47.5%. Respondents reported that their dietary habits were healthier during the pandemic (46.2%), with the majority categorized as high- and very high-income status (59.1%). From self-reported of the people in Indonesia, there was association between high-income level and self-perceived healthier dietary habits. Higher-income level was also associated with higher frequency of online food/drink delivery, consuming western diet foods, consuming dietary supplements, and probiotic consumption ($p < 0.05$).

CONCLUSIONS: During the COVID-19 pandemic, the dietary habits of people with a very high monthly income had eating healthier than before the pandemic. However, it is also related to higher energy, cholesterol, and saturated fat intakes due to consuming high western diet foods. Social inequalities in dietary intake should be considered through promoting a healthy balanced diet with affordable price and healthy food processing in the community.

Introduction

The dietary quality of the people has been a significant concern during the COVID-19 pandemic due to food insecurity caused by this state of emergency. Food insecurity characterized by the unavailability of adequate food or the inability to purchase them can affect the nutritional balance [1] required to maintain optimal health. This is particularly important during the pandemic, where it is essential to build up immunity to decrease the chances of becoming ill from the virus [2].

The COVID-19 pandemic is a widespread virus that spreads to many provinces and regions in the world, such as China, Italy, Thailand, Japan, the United States, the Philippines, Vietnam Republic of Korea, Iran, and Indonesia [3], [4], [5]. To combat the spread of the virus, many preventative measures were implemented by governing bodies worldwide. Countries including Germany, Hong Kong, Japan, New Zealand, and more implemented policies such as mandatory quarantine, physical distancing, and isolations following China's lead and following the recommendations by the WHO [6], [7]. Likewise, Indonesia has also implemented a large-scale social distancing policy requiring people to stay, work, study from home, and maintain physical distance [8]. However, such procedures that require major lifestyle and behavioral changes can cause many

consequences such as increased stress, job loss, and limited food options, all of which can contribute to and determine people's eating habits. Furthermore, the decline in household income due to decreased job security, disrupted food supply chains, hoarding, and waste of food by consumers all play an essential role in shaping the food environment in the community [9]. Overall, this pandemic has presented new challenges for people to maintain a healthy diet due to the food insecurity that has emerged [9].

Few studies have investigated the relationship between household income levels and people's eating habits in Indonesia during the unique social environment of the COVID-19 pandemic. This study examined how household income levels influence people's dietary habits in Indonesia during the COVID-19 pandemic.

Materials and Methods

Study setting and design

This was a cross-sectional study using convenience sampling. The study included 697 Indonesian adults from various regions in Indonesia and was conducted from June to August 2020. Data were obtained through a self-administered online questionnaire in Google Forms that included total of 57 questions about dietary habits, lifestyles, and quality of life. The questionnaire was adapted from the MyNutriLifeCOVID-19 online survey [10]. Data were collected from members, including academia, health-care organizations, local communities, and government. We collected data by distributing online link surveys in the social media to several target groups or community groups for easily reach respondents throughout Indonesia quickly and efficiently. People who live in Indonesia can be registered to this survey, especially for those with large-scale social restrictions due to the COVID-19 pandemic. The participants who completed the online survey receive reward in the form of cash vouchers which will be distributed after the data collection period for 30 randomly selected participants. The inclusion criteria in this study were adult women or men with a minimum age of 18 years. The exclusion criteria were pregnant women and those diagnosed with diet-related chronic diseases, such as diabetes mellitus, kidney failure, cancer, or coronary heart disease.

Sociodemographic and dietary habits questionnaire

Demographic characteristics of the respondent were assessed by a self-administered questionnaire in the Google Forms. These included age, gender (male and female), education levels (elementary school, junior high school, senior high school, associate's degree, bachelor's degree, and graduate degree), occupations (civil servant, private employees, entrepreneurs, student, and unemployed), large-scale social restriction (yes and no), place of residence (Java and outside Java), and dietary status compared to before the pandemic (no different, healthier, and less healthy).

For questions related to income levels, we use options (<Rp. 1.500.000, Rp. 1.500.000–Rp. 2.500.000, Rp. 2.500.000–Rp. 5.000.000, and >Rp. 5.000.000). Dietary habits obtained from Google Forms which contains the questions about online food/drink delivery consumption, consuming foods/drinks from western fast-food restaurants, practicing healthier cooking methods (bake, steam, and boil), practicing healthier eating concept (quarter food is carbohydrates, a quarter of food is protein, and half vegetable and fruits are in your plate), drinking sugar-sweetened beverages, consuming sweet food/high sugary foods, consuming fried foods/high-fat foods, consuming dietary supplements, and drinking probiotic drinks.

Data analysis

Descriptive statistics were calculated in the form of frequency and percentage for categorical variables, while the mean and standard deviation were calculated for continuous variables. Sociodemographic characteristics were categorized as gender (male and female), education levels (low, middle, and high) and income level according to the Central Bureau of Statistics 2016 categorized as low, moderate, high, and very high [11], occupations (civil servant, private employees, entrepreneurs, students, non-civil servants/contract employees, BUMN employees, and doctors), large-scale social restriction (yes and no), place of residence (Java and outside Java), and dietary status compared to before the pandemic (no different, healthier, and less healthy). To determine the factors of income level and dietary habits during the COVID-19 pandemic, a Chi-square test was used. Data were analyzed using SPSS version 20 [12]. Data having $p < 0.05$ were considered significant results.

Ethical clearance

This study protocol was conducted in accordance with the Declaration of Helsinki and obtained research approval and feasibility from the Ethical Committee of Alma Ata University (KE/AA/VI/10148/EC/2020). The existence of this ethical clearance is intended to protect respondents and ensure that researchers can apply research protocols in accordance with good practice of the researchers.

Results

Sociodemographic and economic characteristics

A total of 697 respondents participated in the study. The mean age of respondents was 27.66 ± 8.58 years and the majority were women (83.6%). Most of the respondents lived in Java (69.7%) and experienced large-scale social restrictions (47.5%). Almost all (99.0%) respondents had higher education status. Most of the respondents were college students (39.5%). Their dietary habits were reported to be healthier during the pandemic than before the pandemic (46.2%) with the income level of the majority being high and very high income (55.7%) (Table 1).

Table 1: Sociodemographic and economic characteristics (n = 697)

Variables	Percentage
Age group (years)	
18–25	53.9
26–35	30.0
36–45	11.2
46–55	3.9
56–65	0.9
≥65	0.1
Gender	
Male	16.4
Female	83.6
Education status	
Low	0.1
Middle	27.0
High	72.7
Occupation	
Government employees	18.1
Private employees	35.9
Student/college student	39.5
Unemployed	6.6
Income level	
Low	20.1
Moderate	20.8
High	32.0
Very high	27.1
Large-scale social restriction	
Yes	47.5
No	52.5
Place of residence	
Java	69.7
Outside Java	30.0
Dietary history*	
No difference	43.8
Healthier	46.2
Less healthy	10.0

*Dietary history was expected from the dietary status during pandemic compared to before the pandemic COVID-19.

Respondent's dietary habits characteristics

Self-report of the respondents shows that never consuming online food/drink delivery (46.2%), consuming foods/drinks from western fast-food restaurants (46.8%), drinking sugar-sweetened beverages (44.0%), consuming dietary supplements (48.8%), and drinking probiotic drinks (31.9%). The respondents was practicing healthier cooking methods for the one to three times a weeks (30.4%), practicing healthier eating concept (isi piringku) (21.7%), consuming sweet foods/ high sugary foods (40.9%) and consuming fried foods/high-fat foods for the one time/ day (32.4%) (Table 2).

Eating habits during COVID-19 pandemic as compared to before COVID-19 pandemic

During COVID-19 pandemic as compared to before COVID-19 pandemic, the respondents show that there were statistically significant associations between eating habits and healthier eating behaviors in practicing healthier eating concept (isi piringku) ($p < 0.05$) (Table 3).

Less healthy eating behaviors included consuming foods/drinks from western fast-food restaurants, online food/drink delivery consumption, consuming sweet foods/high sugary foods, consuming fried foods/high-fat foods, and drinking sugar-sweetened beverages. There were statistically significant associations between eating habits and less healthy eating behaviors in consuming fried foods/high-fat foods ($p < 0.05$) (Table 4).

The relationship between dietary statuses during the pandemic based on the respondent's income level

Respondents with a high level of income experienced that reported diets were healthier during the pandemic than before the pandemic, while respondents with a low level of income did not experience a change in their diet or there was no difference between before and after the pandemic. However, the relationship between dietary status and income level of respondents was not statistically significant ($p > 0.05$) (Table 5).

Percentage of dietary habits by income level during the COVID-19 pandemic

There were statistically significant associations between income level and dietary habits such as online food/drink delivery, consuming western diet foods, consuming dietary supplement, and probiotic consumption ($p < 0.05$). The eating habits of respondents with high-income level more often order online food/drink, consuming foods/drinks from western fast-food restaurants, consuming dietary supplements, and consuming dietary supplements or as much as 1–3×/week when compared to low- and moderate-income levels (Table 6).

Discussion

Our study demonstrated that people with low and middle incomes reported that their diets did not change in healthfulness from before to during the pandemic, while people with high incomes reported eating healthier during the pandemic. We found that respondents with high incomes chose to eat more healthy foods (e.g., consuming dietary supplements and probiotic drinks) and ordered food online less

Table 2: Respondent's dietary habits characteristics (n = 697)

Variables	2 time/day	1 time/day	4–6 time/week	1–3 time/week	Never
Online food/drink delivery consumption	18 (2.6)	50 (7.2)	55 (7.9)	252 (36.2)	322 (46.2)
Consuming foods/drinks from western fast-food restaurants	18 (2.6)	46 (6.6)	47 (6.7)	260 (37.3)	326 (46.8)
Practicing healthier cooking methods	96 (13.8)	157 (22.5)	158 (22.7)	212 (30.4)	74 (10.6)
Practicing healthier eating concept (isi piringku)	144 (20.7)	149 (21.4)	121 (17.4)	151 (21.7)	132 (18.9)
Drinking sugar-sweetened beverages	24 (3.4)	55 (7.9)	77 (11.0)	234 (33.6)	307 (44.0)
Consuming sweet foods/high sugary foods	52 (7.5)	120 (17.2)	150 (21.5)	285 (40.9)	90 (12.9)
Consuming fried foods/high-fat foods	167 (24.0)	226 (32.4)	150 (21.5)	140 (20.1)	14 (2.0)
Consuming dietary supplements	50 (7.2)	117 (16.8)	62 (8.9)	128 (18.4)	340 (48.8)
Drinking probiotic drinks	49 (7.0)	99 (14.2)	108 (15.5)	219 (31.4)	222 (31.9)

Data presented in n and percentage (%).

Table 3: Eating habits during COVID-19 pandemic in healthier eating behaviors (n = 697)

Healthier eating behaviors	χ^2	p-value*
Practicing healthier eating concept (isi piringku)	3.02	<0.001
Practicing healthier cooking methods	2.97	0.608
Consuming dietary supplements	3.85	0.460
Drinking probiotic drinks	3.67	0.154

*The data presented were tested using Chi-square.

frequently than those with low incomes. Similar findings report that almost half of the group of respondents did not change their diet during the pandemic, 20% of respondents changed their diet to be positive, and 20% to a negative diet [13].

Table 4: Eating habits during COVID-19 pandemic in less healthy eating behaviors (n = 697)

Less healthy eating behaviors	χ^2	p-value*
Consuming foods/drinks from western fast-food restaurants	4.19	0.072
Online food/drink delivery consumption	4.16	0.754
Consuming sweet foods/high sugary foods	3.35	0.085
Consuming fried foods/high-fat foods	2.44	<0.001
Drinking sugar-sweetened beverages	4.07	0.340

*The data presented were tested using Chi-square.

Lower-income households spend a relatively higher share of their total budget on food and in urban areas spend at least half and up to two-thirds of their total budget on food [14]. In low and middle-income countries (LMICs) like Indonesia, high socioeconomic status is generally associated with a healthier diet [15]. Low-income level is associated with poor quality dietary and purchase more sugar-sweetened beverages compared to higher income level in household [16].

Table 5: The relationship between dietary status during the pandemic based on the respondent's income level

Variable	Status of dietary habits during pandemic (n = 697)			
	Unhealthy (n = 70)	Healthy (n = 322)	No different (n = 305)	p-value*
Income level				
Low	14 (10.0)	57 (40.7)	69 (49.3)	0.533
Moderate	15 (10.3)	67 (46.2)	63 (43.4)	
High	19 (8.5)	103 (46.2)	101 (45.3)	
Very high	22 (11.6)	95 (50.3)	72 (38.1)	

Values are expressed as n and percentage (%). *The data presented were tested using Chi-square.

The respondents never consuming dietary supplements (48.8%). Another finding in Indonesia, during the large-scale social restrictions period, the participants self-reported that they reduced eating out and taking multivitamins to prevent COVID-19 [17]. However, self-report of the respondents shows that consuming fried foods/high-fat foods 1 time/day. Similar study in Indonesia reports that some of the respondents still consume high sodium food and drinks, in the form of packaged foods or street food snacks during the COVID-19 pandemic [18].

Street food from informal vendors is a popular means of food consumption in LMICs, because street

Table 6: Percentage of dietary habits by income level during the COVID-19 pandemic (n = 697)

Income levels	2 time/day	1 time/day	4–6 time/week	1–3 time/week	Never	p-value*
Online food/drink delivery consumption						
Low	5 (3.6)	10 (7.1)	8 (5.7)	38 (27.1)	79 (56.4)	<0.001
Moderate	5 (3.4)	13 (19.0)	9 (6.2)	42 (29.0)	76 (52.4)	
High	5 (2.2)	14 (6.3)	23 (10.3)	80 (35.9)	101 (45.3)	
Very high	3 (1.6)	13 (6.9)	15 (7.9)	92 (48.7)	66 (34.9)	
Consuming foods/drinks from western fast-food restaurants						
Low	3 (2.1)	15 (10.7)	15 (8.6)	43 (30.7)	67 (47.9)	<0.001
Moderate	7 (4.8)	10 (6.9)	13 (4.8)	45 (31.0)	76 (52.4)	
High	7 (3.1)	11 (4.9)	7 (5.8)	84 (37.7)	108 (48.4)	
Very high	1 (0.5)	10 (5.3)	12 (7.9)	88 (46.5)	75 (39.7)	
Practicing healthier cooking methods						
Low	19 (13.6)	43 (30.7)	25 (17.9)	37 (26.4)	16 (11.4)	0.323
Moderate	24 (16.6)	30 (20.7)	31 (21.4)	44 (30.3)	16 (11.0)	
High	30 (13.5)	47 (21.1)	50 (22.4)	77 (34.5)	19 (8.5)	
Very high	23 (12.2)	37 (19.6)	52 (27.5)	54 (28.6)	23 (12.2)	
Practicing healthier eating concept (isi piringku)						
Low	28 (20.0)	31 (22.1)	19 (13.6)	28 (20.0)	34 (24.3)	0.654
Moderate	33 (22.8)	33 (22.8)	28 (19.3)	24 (16.6)	27 (18.6)	
High	48 (21.5)	48 (21.5)	40 (17.9)	49 (22.0)	38 (17.0)	
Very high	35 (18.5)	37 (19.6)	34 (18.0)	50 (26.5)	33 (17.5)	
Drinking sugar-sweetened beverages						
Low	6 (4.3)	22 (15.7)	18 (12.9)	41 (29.3)	53 (37.9)	0.076
Moderate	5 (3.4)	11 (7.6)	16 (11.0)	47 (32.4)	66 (45.5)	
High	7 (3.1)	11 (4.9)	22 (9.9)	75 (33.6)	108 (48.4)	
Very high	6 (3.2)	11 (5.8)	21 (11.1)	71 (37.6)	80 (42.3)	
Consuming sweet foods/high sugary foods						
Low	16 (11.4)	28 (20.0)	26 (18.6)	77 (36.4)	21 (13.6)	0.265
Moderate	8 (5.5)	30 (20.7)	33 (22.8)	104 (36.6)	29 (14.5)	
High	16 (7.2)	33 (14.8)	41 (18.4)	53 (46.6)	21 (13.0)	
Very high	12 (6.3)	29 (15.3)	50 (26.5)	51 (40.7)	19 (11.1)	
Consuming fried foods/high-fat foods						
Low	29 (20.7)	59 (33.6)	46 20.0)	32 (22.9)	4 (2.9)	0.787
Moderate	36 (24.8)	70 (34.5)	43 22.8)	53 (15.9)	3 (2.1)	
High	54 (24.2)	50 (31.4)	33 19.3)	23 (23.8)	3 (1.3)	
Very high	48 (25.4)	47 (31.2)	28 24.3)	32 (16.9)	4 (2.1)	
Consuming dietary supplements						
Low	9 (6.4)	27 (19.3)	12 (8.6)	19 (13.6)	73 (52.1)	<0.001
Moderate	13 (9.0)	17 (11.7)	5 (3.4)	20 (13.8)	90 (62.1)	
High	14 (6.3)	33 (14.8)	21 (9.4)	48 (21.5)	107 (48.0)	
Very high	14 (7.4)	40 (21.2)	24 (12.7)	41 (21.7)	70 (37.0)	
Drinking probiotic drinks						
Low	12 (8.6)	26 (18.6)	20 (14.3)	37 (26.4)	45 (32.1)	<0.001
Moderate	12 (8.3)	18 (12.4)	17 (11.7)	37 (25.5)	61 (42.1)	
High	15 (6.7)	32 (14.3)	37 (16.6)	70 (31.4)	69 (30.9)	
Very high	10 (5.3)	23 (12.2)	34 (18.0)	75 (39.7)	47 (24.9)	

Data presented in n and percentage (%). *The data presented were tested using Chi-square.

food is a cheap and convenient source of food [19]. Street food can contribute up to 50% of daily food intake for adult that contain high levels of salt, sugar, and saturated transfats and hence do not necessarily contribute to a healthy diet [20]. Furthermore, during the COVID-19 pandemic, unhealthy diet and mental health (stressed) factor can lead excess of food intake [21].

The diet quality that is not constantly taken care of can lead to overweight and obesity thus making individuals more susceptible to chronic health conditions and diseases. Future public health actions should consider the deteriorating nutritional status of the community as one of the long-term health consequences of the pandemic [22]. Thus, an effort that can be made during the COVID-19 pandemic is to expand the scope of nutrition education to the public, with the aim of increasing

nutritional knowledge related to balanced nutrition intake, self-efficacy in implementing health protocols, and self-efficacy to carry out a balanced nutrition habit [23].

By knowing the relationship between income level and diet due to the COVID-19 pandemic, we know that positive changes occur for high-income groups while low- and middle-income groups do not change. Hence, it needs to be strengthened with further research on the relationship between income levels and eating behavior, especially in urban and rural areas due to regional quarantine and during the COVID-19 pandemic. The strengths of our research include online surveys that easily reach respondents throughout Indonesia quickly and efficiently. Several limitations of the study should be considered. This sample was not representative and lack of generalizability of the Indonesian population because the sample size was small and it was a random sample of the whole population in Indonesia. Second, measurement of height and weight, and dietary intake, including differences in healthfulness before and during the pandemic, were self-reported. Third, we did not assess the respondent's food consumption before the large-scale social restriction. Fourth, the foods queried were very brief and a quality assessment of reported foods was not conducted. Instead, participants were the ones to define the healthfulness of their diet's pre-pandemic and during pandemic, which is very subjective. This study is a survey with a research questionnaire developed after a comprehensive literature review, but it has limitations as we only relied on respondents' subjective perceptions of diet that possibly leads to the actual misreporting of data.

Conclusions

The study found that people with a very high monthly income reported eating healthier during the pandemic than before the pandemic while those with low-income levels reported no change in dietary habits between the two time periods. This finding suggests that the promoting a healthy diet with affordable price and healthy food processing in the community is important, especially for people with low income. We must practice healthy eating daily for effective methods to strengthen the immunity and fight the COVID-19 from infecting our body.

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