

## The Factors Causing Changes in Adolescent Nutritional Status During The Covid-19 Pandemic

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### ABSTRACT

**Background.** *The COVID-19 pandemic has caused many changes, one of which is the nutritional status of adolescents. There is an increase and decrease in nutritional status, which significantly affects the health status of individuals. According to Basic Health Research data (2018), the prevalence of being very underweight in adolescents aged 13-15 is 1.9%, and obesity in adolescents aged 13-15 is 4.8%. Meanwhile, the prevalence of very thin and obese in adolescents aged 16-18 years was 1.4% and 4%, respectively.*

**Research Methods.** *This research is a literature review reviewing several studies as sources of information. The research used in this research is the last five years' research which is accredited.*

**Research Result.** *This study shows the results of changes in nutritional status either increase or decrease. This is caused by several factors, namely the role of parents, physical activity, peers, social media, exercise habits, and consumption patterns. One of the main factors that cause changes in nutritional status is changes in activity in adolescents due to social movements.*

**Conclusion.** *The COVID-19 pandemic has caused many changes in various sectors, including education. One of those who have recovered from the COVID-19 pandemic is teenagers. Most adolescents experience changes in nutritional status during the pandemic. This is because most teenagers learn with courage, resulting in reduced activity. In addition, several other factors also influence changes in adolescent nutritional status, such as the role of parents, social media, peers, exercise habits, and consumption patterns.*

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### BACKGROUND

COVID-19 has become a worldwide pandemic. COVID-19 is a contagious infectious disease in humans caused by a newly discovered type of coronavirus. This virus was first found in Wuhan, China, in December 2019. Common symptoms of COVID-19 are fever, cough, and fatigue. Some COVID-19 patients experience sore throat, diarrhea, loss of smell and sense of taste, skin rash, discoloration of fingers, nasal congestion, headache, and conjunctivitis 1. According to the World Health Organization (2022), the number of COVID-19 cases worldwide decreased by 17% compared to the previous week. Based on data from Kementerian Kesehatan RI (2022), confirmed instances of COVID-19 since the beginning of 4,667,554 points. This can hamper various sectors, such as education, sports, the economy, etc., so they have to carry out activities from home to break the chain of virus spread 4

Adolescence is a time to determine the quality of the next generation. Babies born to mothers with anemia or KEK are at greater risk of experiencing low birth weight, stunting, non-communicable diseases, and complications during 5. According to WHO, an adolescent encounters a transition from childhood to adulthood with an age limit of 12 years to 24 years. According to the Regulation of the Minister of Health of

the Republic of Indonesia Number 25 of 2014, a teenager is aged 10 to 18. Meanwhile, according to the National Family Planning Population Board, the age limit for adolescents is from 10 years to 24 years, and for unmarried 6

Nutritional status is a balance of nutritional intake and body needs in metabolism, which depends on factors such as gender, age, BMI, and physical activity. Nutritional status has several indicators to define a person's nutritional status 7Nutritional status can be influenced by several factors, such as physical activity, economic factors, food availability at home, environmental factors, peers, and family 8. According to Nurwijayanti, Radono, and dan Fazrin (2019), nutritional status in adolescents is influenced by the level of knowledge, infectious diseases, and diet. Riset Kesehatan Dasar (2018) states that the prevalence of very underweight in adolescents aged 13-15 years is 1.9% and in adolescents aged 16-18 years is 1.4%. The majority of obesity in adolescents aged 13-15 years is 4.8% and in adolescents aged 16-18 years is 4%.

The occurrence of the COVID-19 pandemic attracted the authors to discuss the risk factors for changes in nutritional status in adolescents. After knowing the risk factors that cause changes in nutritional status, it is hoped that it can improve good dietary quality in adolescents and provide representation in improving nutritional status in adolescents.

### RESEARCH METHODS

This study uses the method of comparing several articles that are the discussion of this study. The author analyzes several pieces that are by the topic written. The data sources selected are SINTA-accredited articles. The search was conducted using the keywords "nutritional status during a pandemic" and "eating habits during a pandemic." The author quoted and wrote several references, then analyzed them according to the theme. The selected publication year is limited to the last five years.

### RESULTS

According to the search, several factors were found: physical activity, food consumption habits, junk food, the role of parents, and peers. This research focuses on the risk factors and causes of changes in nutritional status in adolescents during the COVID-19 pandemic. The essence of the study reviewed can be seen in table 1.

**Table 1. Research Digest**

Author	Title	Research Methods	Sample and Population	Research Sites	Result
Siti Qomariah, Sara Herlina, Wiwi Sartika, dan Sellia Juwita.	The Effect of Parental Role on the Incidence of Overnutrition in Adolescents in the Era of the COVID-19 Pandemic in Pekanbaru	The method used is an analytic survey with a cross sectional research design. Samples were taken at random or random sampling	Teenagers in Pekanbaru with a sample of 335 teenagers.	Pekanbaru	The research shows that the role of parents is good at 62.01% and 37.9% is not good. As much as 54.3% is in the normal category, and as much as 45.7% has more nutritional status. Parents' role relates to adolescent nutrition during the COVID-19 pandemic.
Erni Rukmana, Tyas Permatasari, dan Esi Emilia	Relationship between Physical Activity and	The method used is a research with cross-sectional	The population in this study were adolescents aged 13-24	Medan.	This research shows that there is a relationship between

		Nutritional Status of Adolescents During COVID-19 Pandemic in Medan City	design with analytical survey method.	years in Medan City with a sample of 99 people.		physical activity and the nutritional status of adolescents during the COVID-19 pandemic.
Wiwi Sartika, Sara Herlina, Siti Qomariah, dan Sellia Juwita.		Peers Influence of Overnutrition in the Era of the COVID-19 Pandemic	This study used a cross-sectional design with an analytical survey method.	This study used a population of all adolescents in Pekanbaru with a sample of 335 people.	Pekanbaru	This study states that there is an influence of peers on the nutritional status of adolescents during the COVID-19 pandemic.
Thesa Markuri, dan Ashan.	Dwi Salmi, dan Haves	The Relationship between Physical Activity and the Nutritional Status of Students at SMKN 03 Muko-Muko Regency during the COVID-19 Pandemic	This study used a cross-sectional research design with analytical observational research methods.	The population in this study were class XII students at SMKN 03 Muko-Muko with a sample of 76 people.	SMKN 03 Muko-Muko Regency, Bengkulu	This study shows that there is a relationship between physical activity and nutritional status in students of SMKN 03 Muko-Muko Regency during the COVID-19 pandemic..
Mustakim, Rusman Efendi, dan Rosenanda Sofiany.	Intan	Food Consumption Pattern of Productive Age Population during the COVID-19 Pandemic	This study used a cross-sectional research design with quantitative descriptive methods.	The population in this research is the productive age population in South Tangerang City with a sample of 133 people.	South Tangerang	This study shows the results of an increase in consumption of vegetables and fruit, main meals, white water, spices, supplements, snacks, fast food, and snacks.
Chorinne J. E. Raming, Alexander S. L. Bolang, Shirley E. S. Kawengian, Nelly Mayulu.		Energy Intake and Nutritional Status of Students during the COVID-19 Pandemic	This research is an analytic observational study with a cross-sectional research design.	The population in this study were all students of the Faculty of Medicine, Sam Ratulangi University, Manado, with a sample of 105 students.	Faculty of Medicine, University of Sam Ratulangi Manado.	This study shows that there is no significant relationship between energy intake and nutritional status during the COVID-19 pandemic.
Margaretha Prisylyvia, Marsella D. Amisi, dan Ester	D.	Overview of Diet in Adolescents in Sarani Matani	This type of research is a descriptive research with	The population in this study were teenagers in Sarani Matani	Sarani Matani Village, Tombariri District,	This study shows that the consumption of rice, chicken

C. Musa.	Village, Tombariri District during the COVID-19 Pandemic	quantitative data analyzed univariate.	Village, Tombariri District, Minahasa Regency with a sample of 51 people.	Minahasa Regency, to be precise at GMIM Syallom Sarani Matani	eggs, skipjack fish, tempeh, tofu, kale, tomatoes, bananas, apples, fried chicken and donuts has the highest frequency of other staple foods..	
Endah Permana dan Setyowati	Budi Putri Arum	Nutrition Knowledge and Attitudes of Adolescents with Fast Food Consumption Patterns During the Study From Home (SFH) Period	This study is an observational study with a cross-sectional design.	The population in this study were adolescents from RW 04, Darmo Village, Wonokrom District, Surabaya with a sample of 62 respondents.	Darmo Village, Wonokrom, Surabaya.	This study stated that there was no significant relationship between adolescent nutritional knowledge and fast food consumption patterns when studying from home.
Testcia Susmiati, dan Deswita.	Arifin, dan	Are Eating Habits and Physical Activity Related to Obesity During the COVID-19 Pandemic?	This research is a cross-sectional study.	The population in this study were young women in 3 junior high schools in Padang City with a sample of 94 people.	Padang City	This study shows that there is no significant relationship between the frequency of breakfast, snacks, eating vegetables, and fried food consumption with nutritional status. During the COVID-19 pandemic. However, there is a significant relationship between physical activity and nutritional status.
Festy Mustofa, Husna, Hermawan, dan Siti Langki.	Ladyani Ismalia Dessy Sarah	Gambaran Angka Kenaikan Berat Badan Masa Pandemi COVID-19 pada Mahasiswa Angkatan 2017 Fakultas Kedokteran Universitas	This research is a descriptive study with primary and secondary data.	The population of this study was the 2017 students of the Faculty of Medicine, Malahayati University with a sample of 44 people.	Malahayati University	The sample in this study experienced weight gain, were female and had an obese nutritional status and experienced changes in their eating patterns during the

Malahayati							COVID-19 pandemic.
Dian Agnita dan Niriayah.	Hafiza, Utmi, Sekani	The Relationship between Eating Habits and Nutritional Status in Junior High School YLPI Pekanbaru	This research is a correlative descriptive study with a cross-sectional design.	The population in this study were all junior high school students YLPI Pekanbaru with a sample of 76 people.	Junior High School YLPI Pekanbaru	This study shows that the majority of respondents have poor eating habits and have normal nutritional status. This study showed that there was no relationship between eating habits and nutritional status in SMP YLPI Pekanbaru.	
Sara Siti Wiji dan Juwita	Herlina, Qomariah, Sartika, Sellia	The Effect of Fast Food on Overnutrition in Adolescents in the Era of the COVID-19 Pandemic	This research is a quantitative study with a cross-sectional design.	The population in this study were teenagers in Pekanbaru with a sample of 335 people.	Pekanbaru	This study shows the effect of fast food on adolescent nutrition during the COVID-19 pandemic.	
Ashifa Jumiyati, dan Kusdalinah	Mutia, dan	Diet and Physical Activity Patterns on Adolescent Obesity During the COVID-19 Pandemic	This research is an analytic observational study with a cross-sectional design.	The population in this study were students of SMPN 20 Bengkulu City with a sample of 96 people.	Bengkulu City	This research shows that there is a relationship between diet and nutrient intake and between physical activity and adolescents who are obese during the COVID-19 pandemic.	
Rizti Putrid Ayu Sartika	Millva Ratu Dewi	The Impact of the COVID-19 Pandemic on the Consumption Habits and Sports Habits of Selected High School Adolescents in West Lampung Regency	This research is a research with cross sectional design.	The population in this study were high school students who were selected in West Lampung Regency with a sample of 295 people.	West Lampung	This research shows that there are differences in the frequency, duration, habits of eating vegetables and fruit during and before the COVID-19 pandemic. As well as not finding differences in snack habits, consumption of fast food, fried foods and soft drinks before	

						and during the pandemic.
Christy R. Bolang, Shirley E. Kawengian, Nelly Mayulu, dan Alexander S. L. Bolang.	Nutritional Status of Students Before and During the COVID-19 Pandemic	This research uses observational retrospective study method.	The population in this study were students of the class of 2019 Medical Education Study Program, Faculty of Medicine, Sam Ratulangi University	Faculty of Medicine, University of Sam Ratulangi Manado.		In this study, it can be seen that during the pandemic there was a change in the nutritional status of students.
Enrico D. Supit, Nelly Mayulu, Alexander S. L. Bolang, Shirley Kawengian.	Physical Activity and Nutritional Status of Students during the COVID-19 Pandemic	This study used a cross-sectional design.	Students from Medical Education Faculty of Medicine Unsrat 2017 with a sample of 105 people.	Faculty of Medicine, University of Sam Ratulangi Manado.		This study shows that there is a significant relationship between metabolic equivalent (MET) or physical activity with BMI.
Arifah Kaharina, Idzam Kholid Akbar, Oce Wiriawan, dan Hari Setijono.	Decreased Physical Activity and Improved Nutritional Status During the COVID-19 Pandemic in Sports Students	This study uses a survey method..	The population of this study were students of the Faculty of Sports Science, State University of Surabaya with a sample of 117 people.	Surabaya State University		This research shows that there were significant changes in physical activity and BMI during and before the pandemic.
Charles Leonardo, Dary, dan Dennys Christovel Dese	Overview of Nutritional Status and Physical Activity of Adolescents During the COVID-19 Pandemic	This study used a descriptive quantitative method with a cross-sectional design.	This study used students of SMPN 2 Raren Batuah as a population with a sample of 91 people.	Raren Batuah Middle School 2, Unsum Village, Raren Batuah District, East Barito Regency, Central Kalimantan Province.		This research shows that the majority of adolescents' nutritional status during the pandemic was normal with light activity.
Fillah Fithra Dieny, Firdananda Fikri Jauharany, A. Fahmy Arif Tsani, Choirun Nissa	Eating Behavior Before and During the COVIS-19 Pandemic in Teenagers and Adults in Indonesia	This research is a research with cross-sectional design. .	The population in this study are productive individuals who live in Indonesia with a sample of 563 people.	Indonesia		This study states an increase in consumption during the COVID-19 pandemic.

## DISCUSSION

Several factors cause changes in adolescent nutritional status. Research by 11 explains that parents' role is related to more nutritional status in adolescents during a pandemic. This is because parents can support and prohibit adolescents from consuming food. The part of parents can have an impact on the consumption habits of adolescents, both the amount and type of food destroyed. The more significant the role of parents, the better the nutritional status of adolescents because parents are role models in consuming food. In addition to

the eating habits of parents, the level of parental knowledge is another factor because a person's ability can affect his behavior 11.

Research by Rukmana et al. (2020) shows a relationship between physical activity and the nutritional status of adolescents during the COVID-19 pandemic. This is because little physical activity can increase body weight. On the other hand, increased physical activity is needed during a pandemic because it can balance preventing weight gain and boosting the immune system, thereby affecting the quality of life. This research obtained the right policies for adolescents, namely improving the nutritional status of adolescents with nutrition education, fortification, and supplementation to improve the quality of life of adolescents. 12.

Research by Sartika showed a significant influence on the role of peers with more nutritional status. This is in line with several other studies. Adolescence is a transitional period with various changes in preferences, attitudes, and habits. Teenagers spend most of their time outside with friends and consuming food together. This habit can influence eating choices in adolescents so that it affects adolescent weight. 13

Research conducted by Markuri showed the results of a relationship between physical activity and nutritional status. This is because the body requires a balance of energy. Namely, the incoming point is equivalent to the amount of energy out. Therefore, body weight can increase when there is more incoming than outgoing energy. In addition, the sedentary lifestyle is growing and is supported by the conditions of the COVID-19 pandemic due to restrictions on activities outside the home, such as schools and sports facilities. Another factor that can influence food intake in adolescents 14.

Research conducted by Mustakim shows that there has been a change in consumption patterns during the COVID-19 pandemic. This is because the sample has a lot of free time and low physical activity, so they choose to eat in their free time. Restrictions on activities can lead to boredom and low levels of dopamine in the body, so individuals choose foods to increase pleasure and divert boredom. Increased consumption of vegetables and fruit because they contain antioxidants to help boost immunity. This also occurs in the increase in herbal drinks and supplements. 15

Research conducted by Rambling et al. showed that the average respondent's intake was <2250 calories for women and <2560 calories for men. Most respondents had normal nutritional status, followed by grade 1 obesity. This shows no significant relationship between energy intake and the nutritional status of students of the Medical Education Study Program, Faculty of Medicine, the University of Sam Ratulangi, during the COVID-19 pandemic. This is different from other studies, which state that there is a relationship between BMI and food consumption due to other factors such as lack of physical activity, boredom, depression, and increased consumption during the pandemic 16

Research conducted by Prislivia stated that the food consumed by adolescents did not have a lot of food ingredients and was not varied. Staple foods such as bread, noodles, and flour are used as side dishes or snacks. In vegetable side dishes, tempeh and tofu are widely consumed because they are easier to obtain and the prices are affordable. The lack of consumption of various types of food is due to the unavailability of food in the surrounding environment or the home environment 17

Endah's research states that most adolescents have insufficient nutritional knowledge, poor attitudes, and often consume fast food. This study showed no relationship between nutritional knowledge and fast food consumption because other factors influenced adolescents in choosing the food they consumed, such as social media, environment, peers, and the role of parents. Adolescent attitudes and eating habits have a negative relationship. That is, if there is an increase in mood, then there is a decrease in fast food consumption patterns 18.

The relationship between parental pattern regularity and nutritional status during a pandemic was not seen in Arifin's research because there are other factors, such as gender, diet, physical activity, economic, environmental, and psychological factors, that can affect the nutritional status of adolescents. Respondents in this study did not show a relationship between breakfast frequency and nutritional status during a pandemic. This study shows a connection between the frequency of fried food consumption and nutritional quality because fat intake becomes excessive, and there is a high probability of obesity. This study found an

association between physical activity and nutritional status during a pandemic because physical exercise can balance incoming energy with the energy used by the body 19.

Research conducted by Mustofa found that respondents experienced weight gain because, during the pandemic, their activities were limited, causing boredom and consuming more food. Respondents in this study had obesity nutritional status level 2 with increased eating patterns because respondents chose to consume food to spend their time 20.

Research conducted by Hafiza stated that the sample had a poor eating pattern with normal nutritional status, so it could be seen that there was no relationship between nutritional status and eating habits in adolescents. This is because junior high school students have increased physical activity, so the energy consumed is by the point used 8.

Research conducted by Herlina stated that there was an effect of consuming fast food with more adolescent nutrition during the COVID-19 pandemic. This is because fast food contains high calories from fat and carbohydrates. Excessive consumption of fat and carbohydrates can cause calories in the body to increase and be stored in the body. During the pandemic, teenagers chose to consume fast food excessively due to being under stress. In addition, during the COVID-19 pandemic, adolescents reduced their physical activity because all activities can be carried out online, and decreased physical activity can reduce the energy used, leading to overnutrition. 21.

Research conducted by Mutia, when viewed from the diet, the majority of teenagers rare frequency because teenagers rarely eat breakfast and eat only the foods they like. During the pandemic, adolescents' physical activity was classified as moderate, with most adolescents not experiencing obesity. This eating pattern and physical activity can be a factor in preventing the occurrence of obesity in adolescents because the food consumed does not meet the needs of moderate physical activity 22

The research conducted by Putri shows that there are differences in exercise habits during and before the COVID-19 pandemic. Teenagers experience a change to frequent sports with reduced duration. This is due to restrictions and prohibitions on outdoor activities, so sports are only done at home, and more time is spent studying in front of a screen. (R. M. Putri & Sartika, 2021). In Christy's research, it can be seen that significant weight loss and BMI occurred during the COVID-19 pandemic. Changes in body weight, BMI, and nutritional status can occur due to changes in physical activity and eating patterns during the COVID-19 pandemic 23

A study by Supit et al. (2021) shows the relationship between metabolic equivalent and BMI. The data of individuals with a lower BMI and high physical activity demonstrate this. This is because physical activity is a factor causing changes in nutritional status based on BMI. During the pandemic, individuals reduce their physical activity due to social restrictions. Therefore, during the pandemic, individuals also change the quality and quantity of intake, resulting in changes in BMI. This study agrees with research conducted by 25, which showed that most adolescents had light physical activity during the pandemic, so adolescents were at risk of gaining weight and becoming obese.

A relationship between physical activity and nutritional status during the pandemic was also found in the study of Katharina et al. (2021). According to Katharina et al. (2021), the pandemic caused students to carry out online activities, so students were more in front of the screen to do lectures. Activities like practice are still carried out but could be more optimal due to limited facilities and infrastructure. The increase in BMI during the pandemic is due to changes in physical activity with fixed consumption patterns. In a study conducted by Fillah Fithra Dieny et al. (2021), it was found that there was a change in diet before and during the pandemic. Students more often consume animal protein, vegetables, vegetables and fruit, and there is an increase in fluid consumption. Changes in student eating patterns can be seen in the frequency, type, and amount of food consumed during the COVID-19 pandemic. This is because, during the pandemic, they are required to carry out quarantine which makes students stressed. During the pandemic, there is no time limit on consuming food, so it can cause the body's metabolism to be disrupted, and obesity occurs.

The results of the journals that have been reviewed can be seen during the pandemic, and adolescents experience changes in body weight, both weight gain, and loss. During the pandemic, teens tend to sit in front



of screens to participate in distance learning. The existence of social restrictions causes adolescents to feel stressed, so adolescents choose to eat as a stress reliever. In addition, the presence of social constraints causes teenagers to feel bored quickly. In spending time, teenagers choose to eat snacks. During the pandemic, teenagers spend more time with their parents. Parents have the authority to limit children's food consumption, and the availability of food at home is mainly provided by parents so that parents take part in changing the nutritional status of adolescents. During the pandemic, teenagers often consume junk food with low activity levels, so the body experiences fat accumulation due to an imbalance between the energy consumed and the energy expended. Friends and social media more easily influence teenagers because teens spend more time with friends and use social media. These two factors can affect changes in adolescent nutritional status during the pandemic.

### **CONCLUSIONS**

The COVID-19 pandemic has caused many changes in various sectors, including education. One of those affected by the COVID-19 pandemic is youth. The majority of teenagers experienced changes in their nutritional status during the pandemic. This is because most teenagers do online learning resulting in reduced youth activities. In addition, several other factors also influence changes in adolescent nutritional status, such as the role of parents, social media, peers, exercise habits, and consumption patterns.

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