Received:16-02-2022,Revised: 21-03-2022, Accepted:04-07-2022, Published:01-12-2022

RESEARCH STUDY Open Access

Hubungan Durasi Tidur, Kebiasaan Olahraga, Aktivitas Fisik dan Frekuensi Makan Dengan Siswa SMAN 22 Surabaya Pada Pandemi Covid-19

The Relationship of Sleep Duration, Excersise Habits, Physical Activity and Eating Frequency to Nutritional Status of Students of SMAN 22 Surabaya During the Pandemic Covid-19

Reza Farhana Zuhar*[1], Trias Mahmudion [2]

ABSTRAK

Latar belakang: Pandemi covid-19 yang mewabah ke seluruh negeri menyebabkan perubahan pola perilaku karena adanya pembatasan sosial. Hal tersebut mengakibatkan kegiatan di luar rumah dan di ruang terbuka dibatasi bahkan ditiadakan diganti dengan kegiatan daring (dalam jaringan). Para pelajar yang biasanya mengikuti kegiatan belajar mengajar dan melakukan aktivitas olahraga serta ekstrakurikuler yang disukainya di sekolah berubah menjadi kegiatan daring di rumah. Remaja tidak dapat bersosialisasi dengan teman-temannya dan ruang gerak mereka menjadi terbatas selama pandemi Covid-19 sehingga mereka cenderung bermain sosial media dan mendapatkan banyak gangguan tidur serta mengalami depresi. Selain aktivitas yang berubah, pola makan dan durasi tidur remaja juga berubah karena perubahan rutinitas harian. Kondisi itu berpengaruh terhadap status gizi remaja.
Tujuan: Penelitian ini dilakukan untuk menganalisis hubungan antara durasi tidur, kebiasaan olahraga, aktivitas fisik dan frekuensi makan dengan status gizi pada siswa siswi SMAN 22 surabaya
Metode: penelitian ini merupakan studi observasional analitis yang dilakukan di SMA Negeri 22 surabaya dengan 170 responden berusia 15-17 tahun. Pengukuran yang dilakukan antara lain status gizi responden , antropometri, durasi tidur, kebiasaan olahraga, aktivitas fisik dan frekuensi makan remaja selama pandemi. Analisis statistik yang digunakan untuk menguji hipotesis penelitian ini menggunakan tes chi-square.
Hasil: Status gizi non obesitas sebanyak 94 siswa, dan status gizi obesitas sebanyak 76 siswa. Responden dengan durasi tidur pendek 53 siswa, durasi tidur cukup 105 siswa, dan durasi tidur panjang 12. Responden dengan kebiasaan olahraga rutin 45 siswa, dan kebiasaan olahraga tidak rutin 125 siswa. Responden dengan aktivitas fisik ringan 75 siswa, aktivitas fisik sedang 49 siswa, dan aktivitas fisik tinggi 45 siswa. Responden dengan frekuensi makan rendah 113 siswa, frekuensi makan sedang 37 siswa dan frekuensi makan tinggi 20 siswa.
Kesimpulan: status gizi berhubungan dengan durasi tidur, kebiasaan berolahraga, dan frekuensi makan selama pandemi.

Kata kunci: keragaman pangan, stunting, malnutrisi, Indonesia

ABSTRACT

Background*: The COVID-19 pandemic that has spread throughout the country has caused changes in behavior patterns due to social restrictions. This has resulted in activities outside the home and in open spaces being limited and even abolished and replaced with online activities (in the network). Students who usually take part in teaching and learning activities and do sports and extracurricular activities that they like at school turn into online activities at home. Teenagers cannot socialize with their friends and their space becomes limited during the Covid-19 pandemic so they tend to play social media and get a lot of sleep disorders and experience depression. In addition to changing activities, adolescents' eating patterns and sleep duration also change due to changes in daily routines. This condition affects the nutritional status of adolescents.*
Objectives*: This study was conducted to analyze the relationship between sleep duration, exercise habits, physical activity and eating frequency with the nutritional status of the students of SMAN 22 Surabaya.*

***Methods**: This research is an analytical observational study conducted at SMA Negeri 22 Surabaya with 170 respondents aged 15-17 years. The measurements taken included the respondent's nutritional status, anthropometry, sleep duration, exercise habits, physical activity and adolescent eating frequency during the pandemic. Statistical analysis used to test the hypothesis of this study using the chi-square test.*
***Results**: The nutritional status of non-obese as many as 94 students, and nutritional status of obesity as many as 76 students. Respondents with short sleep duration were 53 students, adequate sleep duration was 105 students, and long sleep duration was 12. Respondents with regular exercise habits were 45 students, and non-routine exercise habits were 125 students. Respondents with light physical activity were 75 students, moderate physical activity was 49 students, and high physical activity was 45 students. Respondents with low eating frequency were 113 students, 37 students had moderate eating frequency and 20 students had high meal frequency.*
***Conclusion**: nutritional status is related to sleep duration, exercise habits, and eating frequency during the pandemic.*

***Keywords:** dietary diversity, stunting, malnutrition, Indonesia*

*Koresponden:
reza.farhana.zuhar -2014@fkm.unair.ac.id
Reza Farhana Zuhar
Nutrition Department, Faculty of Public Health, Airlangga University,
Mulyorejo, 60115, Surabaya, Jawa Timur, Indonesia

INTRODUCTION

World Health Organization (WHO), adolescence is a period of transition from childhood to adulthood (WHO, 2019). Adolescence is in between these two periods. During this transition period, adolescents are then divided into three age categories, namely ages 10 to 14 years, 14 to 17 years, and ages 17 to 21 years which is the end of adolescence (WHO, 2019). At each period and category, there are different activities and needs carried out by adolescents, one of the different needs is nutritional needs.

Adolescent nutrition is then divided into different categories according to existing nutritional status. These nutritional statuses are underweight, normal or ideal weight, and overweight (Ministry of Health of the Republic of Indonesia, 2018). Excess weight or also known as overweight and obesity experienced by children continues to increase until in 2014 there were 41 million children who were overweight (WHO, 2016). Cases of overweight and obesity that occur in Indonesia are among the highest rates in Southeast Asia, with a percentage of 11.5% (Asia Development Bank, 2016). Data stored by the East Java Provincial Health Office, there is an increase in obesity cases in children and adolescents by more than one hundred and twenty million cases within one year, from 2015 to 2016 (East Java Provincial Health Office, 2017). Based on these data, it can be concluded that excess weight in children is a health problem that has a tendency to increase every year, so this case can be a serious problem for adolescents and adults because adolescence is a transition period from childhood to adulthood.

Health problems related to weight have a close relationship with the lifestyle of teenagers. Changes in lifestyle experienced by adolescents either individually or influenced by the environment. Such as the occurrence of a pandemic that causes many lifestyle changes. Such as the lack of outdoor activities such as school, sports and doing social activities with friends. Reduced activity also affects the frequency of food consumed by teenagers every day. Until the change in sleep duration due to no obligation to attend school. In general, adolescents need the right amount of sleep, physical activity and frequency of eating to help them grow and develop physically and mentally. (Chang et al., 2016).

The 2019 Coronavirus Disease (COVID-19) pandemic was officially declared to have entered Indonesia on March 9, 2020 (WHO, 2020). So what is happening now, requires everyone to reduce outdoor activities and self-quarantine so that it affects lifestyle, especially the sedentary lifestyle (Mattioli et al., 2020). The pandemic limits teenagers from expending daily calories and changing life habits that are increasingly irregular due to the effects of a lack of mandatory activities at their age. In fact, with the fulfillment of nutritional intake, as well as physical activity that is in accordance with daily intake, as well as adequate sleep duration becomes a good fortress of self-defense to prevent oneself from contracting the disease. If a good lifestyle is not met, teenagers will be more prone to contracting the disease and worsening the infection. Therefore, knowledge about the picture of a good lifestyle for teenagers is needed to anticipate health problems that arise during the pandemic.

METHOD

This research, which uses analytical observation as a type of research design, was carried out in February

2021 at the State 22 Senior High School (SMA) Surabaya. This research has received approval from the Research Ethics Commission of the Faculty of Nursing, Universitas Airlangga on February 3, 2021 (Number: 2153-KEPK). This study involved 170 male and female high school student respondents with age levels from 15 years to 17 years. Research respondents were selected randomly using simple random sampling method with inclusion criteria including students aged 15 to 17 years, status as students at SMA Negeri 22 Surabaya, and willing to be respondents in this study. As for the exclusion criteria, namely students who are sick and students who use wheelchairs or are in a condition of difficulty standing so they cannot take anthropometric measurements.

The data obtained from this research, namely data on nutritional status, sleep duration, physical activity, exercise frequency and eating frequency. Nutritional status data obtained from anthropometric measurements were then divided into two categories, namely obesity and non-obesity. Anthropometric measurements used are derived from measurements of height and weight, as well as gender and age of the respondents. Measurements were made through filling out a questionnaire with the respondent's personal data and then it was calculated using the BMI/U calculation to determine the respondent's anthropometric category. The anthropometric results were then compressed into two categories, namely obesity and non-obesity. Sleep duration data was assessed by classifying short sleep time <7 hours per day, adequate sleep time with 7-8 hours per day. And long sleep time with > 8 hours per day. Physical activity data was assessed using the GPAQ questionnaire with the division of categories into 3 categories, namely light physical activity, moderate physical activity and heavy physical activity. The questionnaire used is a questionnaire originating from WHO with a view to measuring the level of individual physical activity. The data from the questionnaire contains questions about the level of activity carried out by individuals at home, the duration of doing daily activities and regular exercise carried out by the respondents. And the frequency of eating is obtained from food recall measurements that are recorded within one week with the WhatsApp application. Then respondents were divided into 3 groups, namely low frequency of eating (1-2 times/day eating heavy food), moderate frequency of eating (3 times/day), high frequency of eating (>3 times/day) taking into account the amount of heavy food consumption during 1 day.

This research was conducted at SMA Negeri 22 Surabaya with consideration of many nutritional problems and the large number of athletes who are active students at SMA Negeri 22. Data collection for this study will begin in February 2021, and reporting of results will be carried out from February to May 2021.

The data used in this study is secondary data derived from several types of questionnaires given to respondents online and interactive question and answer using the Whatsapp application. This is done because of the pandemic period that requires minimizing face-to-face contact to avoid disease transmission, in this case Covid-19. This study used several instruments, namely a questionnaire about the respondent's personal data, a questionnaire about sleep duration, the respondent's eating frequency and the respondent's physical activity. The analysis carried out for this research is univariate data analysis conducted in tabular form. The second analysis used is bivariate analysis which is used to see the relationship between the independent and dependent variables. The analysis used in this study is an analysis using chi-square statistical tests to determine the relationship between the independent and dependent variables, as well as cross tabulation for bivariate analysis.

RESULT AND DISCUSSION

Table 1. Respondent Overview

Variable	Category	n	%
Age	15 years old	2	2
	16 years old	79	46,6
	17 years old	89	52,3
Gender	Boy	76	44,7
	Girl	94	55,3

Respondent Overview

According to Table 1, there were 170 students and students involved in this study. Respondents were divided into 2 students aged 15 years, 79 students aged 16 years, and 94 students aged 17 years. The sex distribution of the respondents was divided into 76 male and 94 female students. This age is grouped as a teenager according to the year and age when a person is not concerned with the intake that enters the body. Adolescents tend not to care about the amount of intake that enters and leaves the body as long as food and drinks make them full and are able to provide energy to the body (Das et al., 2017).

Table 2. Variables in the Study

Variables	Category	n	%
Nutritional status	Non Obesity	94	55,3
	Obesity	76	44,7

Sleep Duration	Short	53	31,2
	Adequat	105	61,7
	Long	12	7,3
Exercise Habits	Routine	45	26,5
	Non routine	125	73,5
Physical Activity	Light	76	44,7
	Moderate	49	28,8
	Heavy	45	26,5
Eating Frequency	Low	113	66,6
	Moderate	37	21,7
	High	20	11,7

Variables in the Study

Based on Table 2, most of the nutritional status of non-obese respondents, which are thin and normal categories according to BMI/U, are 94 respondents or 55.3 percent, while there are 76 respondents or 44.7 percent who are obese in the overweight and obesity. The majority of respondents had enough sleep duration of 7-8 hours a day as many as 105 respondents or 61.7 percent, respondents with short sleep duration <7 hours a day as many as 53 respondents or 31.2 percent, followed by respondents with long durations >8 hours a day as many as 12 respondents or 7.3 percent. Respondents' exercise habits were dominated by non-routine, amounting to 125 respondents or 73.5 percent, and respondents with exercise habits 45 respondents or 26.5 percent. The majority of respondents' physical activity during the pandemic was included in the light physical activity category with 76 respondents or 44.7 percent, followed by respondents with moderate physical activity as many as 49 respondents or 28.8 percent and respondents with high physical activity as many as 45 respondents or 26.5 percent. . Respondents who have high physical activity, are the same respondents as respondents with the habit of exercising because the respondents are athletes who continue to practice regularly during the pandemic. Then there is the frequency of eating with the majority of respondents having a low frequency of eating 1-2 times a day as many as 113 respondents or 66.6 percent, then respondents with a moderate frequency of eating 3 times a day as many as 37 respondents with 21.7 percent and respondents with a high frequency of eating as many as 20 respondents or 11.7 percent.

Based on data from Riskesdas 2018, in Indonesia, adolescents experienced an increase in the prevalence of obesity at the age of 16-18 years as much as 2.2% and East Java was included in a province with a prevalence exceeding the national prevalence, which was 11.3% for ages 16-18 years (Ministry of Health, Republic of Indonesia). , 2018). Factors that cause changes in nutritional status are age, gender, sleep duration, medical history, frequency and amount of food consumption, nutritional knowledge, and lack of physical activity (Setiawati et al., 2019).

During the COVID-19 pandemic, adolescents experience lifestyle changes such as changes in the frequency of eating heavy meals, physical activity to sleep duration. Based on the Riskesdas research (2018), it was found that there was 42.5% of teenagers doing less physical activity (Riskesdas 2018). According to research conducted by Rahayu (2020) showed as many as 29.6% of adolescents did not do physical activity during the pandemic. And 23% are overweight and obese. During the pandemic, most teenagers sabotage their sleep at night by playing social media until the early hours of the morning. So that the need for time to sleep is reduced (Bagus, 2020).

When the body's needs and nutritional input into the body are appropriate, then the nutritional status can be said to be good or efficient, and optimal. This good nutritional status can then help the body to grow and develop, as well as improve work skills and general health. In general, according to the Ministry of Health in 2018, nutritional status can be grouped into five categories according to the results of the z-score obtained from the BMI/U measurement, namely very thin, thin, normal, overweight, and obese (Kementrian Kesehatan, 2018) . In this study, the nutritional status category was re-compressed into two categories, namely non-obese and obese.

Table 3. Cross Tabulation of Nutritional Status and Sleep Duration

Sleep Duration	Nutritional Status				Total		P value
	Non obesity		Obesity				
	n	%	n	%	n	%	
Short (<7hour/day)	24	45,2	29	54,7	53	100,0	0,003
Adequat (7-8hour/day)	29	50,0	29	50,0	105	100,0	
Long (>8 hour/day)	5	41,7	7	58,3	12	100,0	

Relationship between Nutritional Status and Sleep Duration

Respondents in the category of non-obese nutritional status were divided into 3 groups, namely respondents with short sleep duration (<7 hours/day), adequate sleep duration (7-8 hours/day), long sleep duration (>8 hours/day). In the group with short sleep duration there were 24 respondents or 45.2%, while for sufficient sleep duration there were 29 respondents or 50%, and in the long sleep duration group there were 5 respondents or 41.7%.

Respondents with obesity nutritional status category were also divided into 3 groups, namely respondents with short sleep duration (<7 hours/day), adequate sleep duration (7-8 hours/day), long sleep duration (>8 hours/day). In the group with short sleep duration there were 29 respondents or 54.7%, while for sufficient sleep duration there were 29 respondents or 50%, and in the long sleep duration group there were 12 respondents or 58.3%. Based on the Chi-Square test, the p-value was 0.003> 0.05 (alpha) so it can be concluded that H_o was rejected, which means that there is a significant relationship between nutritional status and the duration of the respondent. In this study, adolescents with short sleep duration were more likely to be obese. Likewise, long sleep duration is also experienced by obese adolescents.

The results of this study are also in line with research by Eisenmann in Old at al (2010) which shows that sleep duration is associated with the risk of being overweight and obese. The role that sleep duration has is regulating the metabolism of hormones such as the hormones leptin and ghrelin. A person who does not get enough sleep will increase the secretion of the hormone ghrelin, the hormone ghrelin is an appetite-enhancing hormone and the hormone leptin which is in charge of holding back hunger will decrease (Lestari, 2018). Meanwhile, obese adolescents with longer sleep times usually reduce their physical activity so that they spend more time sleeping than their daily activities (Mufidah, 2021).

Table 4. Cross Tabulation of Nutritional Status and Exercise Habits

Excersise	**Nutritional Status**				Total		P value
	Non Obesity		Obesity				
	n	%	n	%	n	%	
Routine	34	75,6	11	24,4	45	100,0	0,024
Non-routine	72	57,6	53	42,4	125	100,0	

Relationship between Nutritional Status and Exercise Habits

Respondents with non-obese nutritional status were divided into 2 groups, namely respondents with regular exercise and non-routine exercise. In the non-obese nutritional status group, there were 34 respondents or 75.6 percent of respondents exercising routinely, and 72 respondents or 57.6 percent not doing regular exercise. Respondents with obesity nutritional status were divided into 2 groups, namely respondents with regular exercise and non-routine exercise. In the obesity nutritional status category, there were 11 respondents or 24.4 percent of respondents who exercised regularly, and 53 respondents or 42.4 percent did not do regular exercise. Based on the Chi-Square test, the p-value was 0.024> 0.05 (alpha) so it can be concluded that H_o was rejected, which means that there is a significant relationship between the nutritional status and exercise habits of the respondents.

Sport is a physical activity that is planned and structured and involves repetitive movements with the aim of improving physical fitness (Khomarun, Wahyuni, & Nugroho, 2013). The results of statistical tests showed a significant relationship between exercise habits and the nutritional status of the respondents. This is because during the pandemic, respondents can determine for themselves when and what kind of exercise they want (Susilo et al, 2020). Exercise habits can increase the body's metabolism and add energy that is stored as fat and burned into calories (Dieny, 2007).

Table 5. Cross Tabulation of Nutritional Status and Physical Activity

Physical Activity	**Nutritional Status**				Total		P value
	Non obesitas		Obesitas				
	n	%	n	%	n	%	
Light	46	60,5	30	39,5	76	100,0	0,782
Moderate	30	61,2	19	38,8	49	100,0	
Heavy	30	66,7	15	33,3	45	100,0	

Relationship between Nutritional Status and Physical Activity

Respondents in the non-obese category with light physical activity were 46 respondents or 60.5 percent, moderate activity were 30 respondents or 61.2 percent, and for the heavy physical activity group were 30 respondents or 66.7 percent. Respondents in the obesity category with light physical activity were 30 respondents or 39.5 percent, moderate physical activity group was 19 respondents or 38.8 percent, and respondents with heavy physical activity group were 15 respondents or 33.3 percent. Based on the Chi-Square test, the p-value was 0.782> 0.05 (alpha) so it can be concluded that H_o is accepted, which means that there is no significant relationship between nutritional status and physical activity of the respondents.

Based on the results of statistical tests, this study did not show a relationship between physical activity and the nutritional status of the respondents. One of the reasons is because there are no meaningful activities during the pandemic that teenagers can do at home. Most of the activities that can be done are only light physical activities that do not require too much energy (Ministry of Health, 2019). Minimal exercise habits from the start may also add to the factor in the absence of an association between physical activity and nutritional status.

In contrast to sports which have standard activities and goals to lose or maintain weight, physical activity can be in the form of daily activities carried out without the intention of losing weight. Physical activity is categorized into three levels, namely light, moderate, and heavy physical activity. In this study, physical activity was then compressed into two categories, namely light and high physical activity.

Research from Latin America shows that adolescents aged 16-19 years during lockdown are 2.89 times less active (Ruiz-Roso, 2020). But research from Hafidz and Purnomo (2021) shows teenagers are still doing their favorite sports during the pandemic. And the lack of awareness of adolescents about the importance of physical activity, so that they consider sports activities one hour/week to be enough so that when they are physically active at home, teenagers tend to be lazy to move. Plus online applications that make everything you need can be done in a sitting or lying position (Chen et al., 2020)

This is in line with this study which did not show a relationship between physical activity and the nutritional status of the respondents. One of the reasons is that the absence of activities means a diving pandemic that can be done by teenagers at home (Firman & Rahayu, 2020). Schools that use online methods make students not have time to practice which is usually routinely done at school (University, 2021).

Table 6. Cross Tabulation of Nutritional Status and Frequency of Eating

Frekuensi Makan	**Nutritional Status**				Total		P value
	Non obesity		Obesity				
	n	%	n	%	n	%	
Low	81	71,7	32	28,3	113	100,0	
Moderate	22	59,5	15	40,5	37	100,0	0,000
High	3	15,0	17	85,0	20	100.0	

Relationship between Nutritional Status and Frequency of Eating

In the non-obese group, the low eating frequency group was 81 respondents or 71.7 percent, the moderate eating frequency group was 22 respondents or 59.5 percent and for the high eating frequency group was 3 respondents or 15 percent. In the obese group, 32 respondents or 28.3 percent had low eating frequency, 15 respondents or 40.5 percent had moderate eating frequency and 17 respondents or 85 percent had high eating frequency. Based on the Chi-Square test, a p-value of 0.000> 0.05 (alpha) was obtained, so it can be concluded that H_o is rejected, which means that there is a significant relationship between nutritional status and the frequency of eating of the respondents.

Feeding frequency is the number of times an individual eats in one day. Individuals usually consume meals consisting of breakfast, lunch, dinner, and snacks (Sulistyoningsih, 2011). The frequency of eating is also based on the frequency with which individuals consume food for one day. In general, a person will eat the main food 3 times a day, but in some situations, individuals sometimes eat less than 3 times or more than 3 times a day (Safitri, 2021).

From the results of an in-depth assessment on the food menus that are usually consumed by respondents, it shows that respondents tend to be able to choose the food to be consumed and what teenagers consume is high-carbo and fat-heavy foods (geprek chicken, crispy fried chicken, fried rice) or low-nutrient snacks with large quantities (meatballs aci, cireng, cimol). So, even though the frequency of consumption of heavy food is low, respondents tend to consume low-nutrition snacks, eat high-carbo foods and lack daily activities and do not exercise regularly. The nutrients that enter are not burned completely due to lack of daily physical activity which results in changes in the nutritional status of adolescents. Teenagers also tend to skip meals, especially breakfast,

irregular meal times, eat fast food, rarely consume vegetables and fruit so that food intake is not in accordance with balanced nutritional needs and consequently becomes undernourished or over-nourished (Irianto, 2014).

CONCLUSION

Based on the results of research on 170 respondents, students of SMAN 22 Surabaya, it is known that respondents have non-obese nutritional status as many as 94 students or 55.3 percent, and obesity nutritional status as many as 76 respondents or 44.7 percent. The results of the analysis showed that there was a significant relationship between nutritional status and sleep duration of SMAN 22 Surabaya students (p=0.003). The results of the analysis showed that there was a significant relationship between nutritional status and exercise habits of students at SMAN 22 Surabaya (p=0.24). The results of the analysis showed that there was no significant relationship between nutritional status and physical activity of students at SMAN 22 Surabaya (p = 0.782). And the results of the analysis showed that there was a significant relationship between nutritional status and the frequency of eating at SMAN 22 Surabaya (p = 0.000). From this study, it can be concluded that the behavior patterns of adolescents who have short sleep duration, do not exercise regularly, have low daily physical activity, and have a low frequency of eating.

ACKNOWLEDGEMENT

Thanks to everyone who helped the writer. Also, thank Mr. Trias Mahmudiono as a research advisor who had helped and guided the writer in implementing research and journal reports, and SMA Negeri 22 Surabaya, who had allowed the writer to conduct online research with the help of students' willingness to be respondents to the writer's research.

REFERENCES

Awalia Safitri, R., Parishudha,A. And Herliyanti, Y. (2021). *Kandungan Gizi dalam Minuman Kekinian Boba Milk Tea*: Gorontalo Jurnal of Public Health. Awalia Safitri, R., Parishudha,A. And Herliyanti, Y. (2021). Kandungan Gizi dalam Minuman Kekinian Boba Milk Tea: *Gorontalo Jurnal of Public Health*.

Chen LD, Zhang ZY, Wei XJ, Cai YQ, Yao WZ, Wang MH, et al. Association between cytokine profiles and lung injury in COVID-19 pneumonia. Respir Res. 2020;21(1):201. https://doi.org/10.1186/s12931-020-01465-2

Collin, P., Rahilly, K., Richardson, I., & Third, A. 2011. The Benefits of Social Networking Services: A Literature Review. Melbourne: *Cooperative Research Centre for Young People, Technology and Wellbeing.*

Das, J. K., Salam, R. A., Thornburg, K. L., Prentice, A. M., Campisi, S., Lassi, Z. S., Koletzko, B., & Bhutta, Z. A. (2017). Nutrition in adolescents: physiology, metabolism, and nutritional needs. *Annals of the New York Academy of Sciences*, *1393*(1), 21–33.

FAO. (2019). *State of Food Secure and Nutrition 2019.* Global: FAO.

Fatmawati, I. (2019). Asupan gula sederhana sebagai faktor risiko obesitas pada siswa-siswi sekolah menengah pertama di Kecamatan Pamulang, Kota Tangerang Selatan. *Ilmu Gizi Indonesia*, *2*(2), 147.

Firman, F., & Rahayu, S. (2020). Pembelajaran Online di Tengah Pandemi Covid-19. *Indonesian Journal of Educational Science (IJES)*, *2*(2), 81–89.

Fitri, N. (2017). Studi Validasi Semi-Quantitatif FFQ Dengan Food Recall 24 Jam Pada Asupan Zat Gizi Mikro Remana Di SMA Islam Athirah Makasar. *Jurnal Skripsi Universitas Hasanuddin*, 1–113.

Gan, W. Y., Mohamed, S. F., & Law, L. S. (2019). Unhealthy lifestyle associated with higher intake of sugar-sweetened beverages among malaysian school-aged adolescents. *International Journal of Environmental Research and Public Health*, *16*(15), 1–13.

Kanah, P. (2020). Hubungan Pengetahuan Dan Pola Konsumsi Dengan Status Gizi Pada Mahasiswa Kesehatan. *Medical Technology and Public Health Journal*, *4*(2), 203–211.

Kartika, N. E. (2020). Fitur Aplikasi Gojek Favorit Konsumen Pada Saat Pandemi COVID-19 Di Kota Bandung. *Jurnal Communio : Jurnal Jurusan Ilmu Komunikasi*, *9*(2), 1680–1695.

Keats, E. C., Rappaport, A. I., Shah, S., Oh, C., Jain, R., & Bhutta, Z. A. (2018). The dietary intake and practices of adolescent girls in low-and middle-income countries: A systematic review. *Nutrients*, *10*(12).

Kementrian Kesehatan, R. (2011). *Keputusan Menteri Kesehatan Republik Indonesia: Standar Antropometri Penilaian Status Gizi Anak*.

Kementrian Kesehatan, R. (2013a). *Peraturan Menteri Kesehatan nomor 75 tahun 2013*.

Kementrian Kesehatan, R. (2013b). *Riset Kesehatan Dasar*.

Kementrian Kesehatan, R. (2019). *Peraturan Menteri Kesehatan Republik Indonesia nomor 28 tahun 2019*.

Kementrian Kesehatan, R. (2020). *Panduan Gizi Seimbang pada Masa Pandemi COVID-19*.

Maretha, F. Y., Margawati, A., Wijayanti, H. S., & Dieny, F. F. (2020). Hubungan Penggunaan Aplikasi Pesan Antar Makanan Online Dengan Frekuensi Makan Dan Kualitas Diet Mahasiswa. *Journal of Nutrition College*, *9*(3), 160–168.

Nainggolan, O., Indrawati, L., & Pradono, J. (2019). Kebugaran Jasmani menurut instrument GPAQ dibandingkan dengan VO2max pada wanita umur 25 sampai 54 tahun. *Buletin Penelitian Sistem Kesehatan*, *21*(4), 271–280.

Notoatmodjo, S. (2010). *Metodologi Penelitian Kesehatan*. Rineka Cipta.

Notoatmodjo, S. (2013). *Promosi Kesehatan Global*. Jakarta: Rineka Cipta.

Noviyanti, R. dewi & M. D. (2017). Hubungan Pengetahuan Gizi, Aktivitas Fisk, dan Pola Makan terhadap Status Gizi Remaja di Kelurahan Purwosari Laweyan Surakarta. *University Research Colloquium Universitas Muhammadiyah Magelang*, 421–426.

Rieuwpassa, F. (2005). *Biskuita Konsentrat Protein Ikan dan Probiotik Sebagai Makanan Tambahan Untuk Meningkatkan Antibodi IgA dan Status Gizi Anak Balita*.

Saragih, B., & Saragih, F. M. (2020). Gambaran Kebiasaan Makan Masyarakat Pada Masa Pandemi Covid-19. *Research Gate*, *19*(April), 1–12.

Setiawati, F. S. (2019). Hubungan Pengetahuan tentang Gizi Seimbang, Kebiasaan Olahraga, Durasi Tidur, Peer Influence, Intensitas Penggunaan Media Sosial, dan Kebiasaan Konsumsi Fast Food dengan Status Gizi Remaja di SMAN 6 Surabaya. Surabaya: *Universitas Airlangga*.

Soraya, D., Sukandar, D., & Sinaga, T. (2017). Hubungan pengetahuan gizi, tingkat kecukupan zat gizi, dan aktivitas fisik dengan status gizi pada guru SMP. *Jurnal Gizi Indonesia (The Indonesian Journal of Nutrition)*, *6*(1), 29–36.

Olds, et al. 2010. *Day Type and The Relationship Between Weight Status and Sleep Duration in Childern and Adolescent. Australian and New Zealand*. Journal of Public Health, Vol.34, Issue 2. [Online]. Tersedia di http://www.ncbi.nlm.nih.gov/pubmed/23331361 [Diakses 10 Desember 2021].

Tello, M. (2020). *Diet and Depression*. Harvard Health. https:www.health.harvard.edu/blog/diet-and-depression-2018022213309

Tepriandy, S., & Rochadi, R. K. (2021). Hubungan Pengetahuan dan Sikap dengan Status Gizi Siswa MAN Medan Pada Masa Pandemi COVID-19. *Hubungan Pengetahuan Dan Sikap Dengan Status Gizi Siswa MAN Medan Pada Masa Pandemi COVID-19*, *1*(1), 43–49.

UNICEF. (2018). *Adolescent Health*.

UNICEF. (2019). *Aksi Bergizi Siswa*.

University, A. (2021). *Sedentary Lifestyle pada Anak Usia Sekolah dan Faktor yang Mempengaruhinya*. Unair News. https://www.news.unair.ac.id/2021/01/21/sedentary-lifestyle-pada-anak-usia-sekolah-dan-faktor-yang-mempengaruhinya/