



# Knowledge and Lifestyle for the Nutritional Status of Female Adolescents at Singosari District

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**Abstract.** Singosari District is in first place for thin nutritional status and sixth place for obese nutritional status from all regions in Malang district. Data from Dinas Kesehatan Kabupaten Malang for 2021 shows the thin nutritional status rate of adolescents is 5.52% and the obese nutritional status rate of adolescents is 3.61%. From these data, there is a gap in the nutritional status of adolescents for both thin and obese nutritional status in Malang district. The research aims to find out how knowledge and lifestyle has an impact on the nutritional status of female adolescents at Kecamatan Singosari. The research design used is quantitative descriptive method through a cross-sectional approach. From 680 populations, 277 samples were taken based on the Slovin formula using simple random sampling technique. Data analysis used logistic regression and Wald test statistics. The results between lifestyle obtained ( $0,002 < 0,05$ ) and knowledge obtained ( $0,000 < 0,05$ ) to nutritional status. The conclusions are that there was significant impact between lifestyle and knowledge on female adolescents' nutritional status. Suggestions for further research need to be considered to examine other factors that can affect the nutritional status and need to use other anthropometric measurements to optimally describe the nutritional status.

**Keywords:** Female adolescents, Nutritional status; Knowledge, Lifestyle

## 1 Introduction

Indonesia has several problems related to health, including specifically related to nutrition. Malnutrition is considered as one of the most important factors in global health including Indonesia which can affect the quality of future generations. Currently malnutrition and the triple burden which includes malnutrition, micronutrient deficiency and obesity are problems that must be faced by Indonesia. Malnutrition includes being underweight, stunting, and wasting. In addition, micronutrient deficiencies cause low levels of vitamin A, vitamin B12, vitamin D, folate, iodine, zinc, iron, and calcium. Excess nutrition includes overweight and overweight (obesity).

According to data from the Ministry of Health, the development of health problems in Indonesia is divided into three categories, namely nutritional problems with public health still under surveillance, health problems that have not been resolved, and

nutritional problems that are still developing and endangering public health. The results of the 2018 Riskesdas show that community knowledge and behavior factors have a significant influence on the incidence of undernutrition in the community. While the nutritional problem that endangers public health and has become a new issue in recent years is excess nutrition. Every year the prevalence of nutrition is mostly in adults and children, which has increased by 1%.

Based on Health Research Data 2018, 25.7% of adolescents aged 13-15 years have short nutritional status, while 26.9% of adolescents aged 16-18 years have very short nutritional status. This nutritional status indicates that the teenager is stunted, which is a condition of chronic malnutrition as measured by BMI instead of using the WHO standard. In addition, there were 8.7% of teenagers aged 13-15 years who were underweight and 8.1% of teenagers aged 16-18 years who were very thin. Meanwhile, the prevalence of overweight for adolescents aged 13-15 years was 16% and obesity was 13.5% for adolescents aged 16-18 years. From these data it is necessary to improve nutrition in adolescents in Indonesia.

The Health Research Data 2018 results, in Indonesia the nutritional status of adolescents aged 16-18 years is 1.4% with severe nutritional status, 6.7% with lean nutritional status, 78.3% with good nutritional status, 9.5% with obese nutritional status and 4.0% are obese nutritional status. Data from the Malang Regency Health Office for 2021, the incidence of adolescents aged 16-18 years with undernourished status is 5.52% and the incidence of adolescents aged 16-18 years with obese nutritional status is 3.61%. In accordance with the available data, it appears that there is a gap in the nutritional status of adolescents for both underweight and obese nutritional status in Malang Regency.

Adolescent nutritional status is a condition in which there is a balance between intake and absorption of nutrients. Poor intake and absorption of nutrients in a person's body can cause nutritional problems, such as deficiency or excess nutrition. Patterns of food intake consumed daily, physical activity, and health conditions are factors that can have a direct impact on nutritional status. Knowledge based on good understanding will shape a person's behavior according to what he wants, especially knowledge of nutrition. Knowledge and understanding of adolescent nutrition is a person's awareness of nutrition, the science of nutrition, and the relationship between nutrition and nutritional status as well as the degree of health. When adolescents' understanding of nutrition is limited, adolescents will also have limitations in trying to maintain a balance in their daily diet and result in problems of deficiency or excess of nutrition.

Several factors can directly and indirectly influence nutritional status. Lack of knowledge becomes an indirect factor. This theory is in line with research conducted by A. E. Damayanti at Adhikawacana Vocational School Surabaya which stated that students with sufficient knowledge had normal nutritional status of 89.40%, 26.70% of thin nutritional status and 46.60% of obese nutritional status. the total turbidity of the sample. These findings indicate a link between knowledge of balanced nutrition on the nutritional status of female adolescents. This means, if a person's nutritional knowledge is good, it will also lead to a good eating pattern. The nutritional status of female students is influenced by the level of knowledge about nutrition and the choice of food consumption.

Lifestyle includes other indirect factors that have an important role in the nutritional status of adolescents. Several lifestyle indicators set by the Indonesian Ministry of Health include diet, smoking habits, and physical activity. The unhealthy eating pattern of adolescents as shown by the Global School Health Survey in 2016 was 65.2% of teenagers who did not have breakfast, the majority of them did not consume fibrous foods and vegetables as much as 93.6% and teenagers usually consumed fast food with a MSG was 75.7%. The percentage of 42.5% of teenagers also tend to be sedentary and result in a lack of physical activity. This can increase the risk of adolescents experiencing overweight and even obesity. Based on a research survey from WHO in 2016, it was explained that 80% of adolescents aged 11-18 years around the world were not active enough to do physical activity, where female adolescents had a higher percentage of 80% compared to male adolescents who had a percentage of 78%.

Malang area has various types of schools to meet the educational needs of various walks of life. Some of the most popular schools or in other words are referred to as favourite schools are in the middle of the city, which is located near shopping centers and culinary place, as well as high schools which are located far from main roads. This has an influence on changes in the lifestyle of high school students. Students who go to school near shopping centers and culinary place have more consumptive habits, including in terms of food choices and changing modern eating patterns. Meanwhile, students whose schools are located far from the main road will choose to use motorbike vehicles as daily mobility and tend to have less physical activity.

Singosari District is one of 33 districts in Malang Regency. Singosari sub-district consists of 14 villages and 3 sub-districts. According to data from the Malang District Health Office, Singosari District is an area with diverse nutritional status. Singosari District ranks first for thin nutritional status and sixth for obese nutritional status from all regions in Malang Regency. Based on BPS data from Malang Regency, Singosari District has 120 schools with 4 senior high schools. Based on East Java Health Profile data, the prevalence of health service coverage for Senior High School students in Malang Regency in 2020 is 77%, meaning that not all schools in Malang Regency get health services for their students.

There is one secondary school in Singosari District which is located far from urban areas and major highways. This makes the students tend to have less physical activity because they do not use public transportation which requires them to walk from public transportation stops. The majority of students at this high school use motorbike vehicles for daily mobility and this is one of the reasons students rarely walk. High school in Singosari District has various kinds of extracurriculars related to physical activity, but through brief interviews with several students it was stated that only a small proportion or only a few female students took part in physical extracurriculars.

Based on the research by Hepti Mulyati regarding the relationship between physical activity, body image, as well as knowledge of balanced nutrition and nutritional status of female adolescents, the results show that there is a significant correlation between physical activity and knowledge of the nutritional status of female adolescents, but there is no correlation between body image and nutritional status of female adolescents. Adolescents with moderate physical activity and high nutritional knowledge have normal nutritional status compared to adolescents with high physical activity but have

poor nutritional knowledge. Therefore, research on the influence of lifestyle and level of knowledge on the nutritional status of female adolescents must be applied to determine other aspects within the scope of adolescent lifestyle that have a significant effect on nutritional status.

## 2 Methods

The research method applies quantitative research with descriptive methods. The research was carried out through a cross-sectional approach, which is applied to be able to examine the dynamics of the correlation of the factors that cause and the impact of data collection or observational. The cross-sectional approach method is a method that is carried out by measuring variables at a point in time and aims to see the influence of lifestyle and knowledge on the nutritional status of female adolescents.

The research was conducted in one of the Senior High School in Singosari Districts in February 2023. Sampling using the Slovin formula resulted in a total of 277 samples. The researcher applied a simple random sampling technique, in which each element of the population has the same opportunity to be selected as the sample. The inclusion criteria in this study were female students aged 16-18 years. While the exclusion criteria were female students who were sick or had a history of certain congenital diseases. The instrument used to measure lifestyle and knowledge was a questionnaire that had been prepared by the researcher, while the research instrument for measuring the nutritional status of female adolescents used the BMI formula. The results of processing the questionnaire data were tested statistically using SPSS with Logistic Regression Analysis and the Wald Test to see the variables that have an influence on the nutritional status of female adolescents in Singosari District. This research has passed the Ethics test of the Faculty of Medicine, Airlangga University with serial number No. 363/HRECC.FODM/IV/2023.

## 3 Results

### 3.1 Univariate Analysis

The subjects in this study were female adolescents who were students at the Senior High School with a total of 277 samples. The individual characteristics identified were the age, weight, and height of the respondents.

**Table 1.** Frequency Distribution and Percentage of Respondents based on Age and Weight

Age	Weight			n
	30 – 40 kg	50 – 60 kg	70 – 80 kg	
16	6	108	1	115
17	2	125	0	127
18	0	35	0	35
Total				277

Based on the data in Table 1, it is known that the age distribution of the 277 respondents was the most at the age of 17, namely 127 female students (45.8%) with the majority having a body weight of 50-60 kg, then at the age of 16 there were 115 female students (41.5%) ) which has one respondent with the highest body weight and the respondent with the oldest age is 18 years, namely 35 female students (12.6%) who have a body weight in the range of 50 – 60 kg.

**Table 2.** Frequency Distribution and Percentage of Respondents based on Age and Height

Age	Height			n
	130 – 140 cm	150 – 160 cm	170 – 180 cm	
16	2	102	1	115
17	0	124	3	127
18	1	33	1	35
Total				277

In Table 2 it is known that respondents aged 17 years had the highest distribution of height in range 170-180 cm for three respondents, while the lowest distribution of height in the range of 130-140 cm, was owned by two respondents aged 16 years and one respondent aged 18 years.

Based on the research carried out, it can be seen that the frequency distribution and percentage of respondents according to the level of knowledge, lifestyle and nutritional status of female adolescents is shown in the table.

**Table 3.** Distribution of Frequency and Percentage of Respondents based on Knowledge Level

Knowledge Level	n	%
Less	67	24.2
Good	210	75.8
Total	277	100.0

Source : Primary Data (2023)

Table 2 shows that respondents who have a good level of knowledge are 210 female students (75.8%) and respondents who have a poor level of knowledge are 67 female students (24.2%). Respondents who have good knowledge (75.8%) are respondents who get a correct questionnaire answer score  $\geq 8$ , where respondents have corrected knowledge about nutrition. Respondents with less knowledge (24.2%) had a correct questionnaire answer score of  $\leq 7$ , these female adolescents still did not know about nutrition properly. Decision making is based on the provisions of the results of research interprets the results using a qualitative scale.

**Table 4.** Distribution of Frequency and Percentage of Respondents based on Lifestyle

Lifestyle	n	%
Low	192	69.3
High	85	30.7

Lifestyle	n	%
Total	277	100.0

Source : Primary Data (2023)

From table 3 above, it can be seen that of the 277 respondents studied, there were more respondents with a low lifestyle category, namely 192 respondents (69.3%) than a high lifestyle category, namely as many as 85 respondents (30.7%). Respondents in the study who were in the low lifestyle category (69.3%) had a lifestyle questionnaire score of  $\leq 39$  as indicated by the answers to the questionnaire which mentioned irregular eating patterns and rarely consuming nutritious food and junk food. In addition, respondents had a low level of physical activity and less sleep duration because almost all respondents often stayed up late to play social media.

Besides that, respondents with a high lifestyle (30.7%) with a score of the lifestyle questionnaire  $\geq 40$  had a fairly good diet and were supported by consuming supplements. Adolescents with a high lifestyle also have good physical activity because they do sports every week outside of sports class hours and take part in extracurricular activities related to physical activity such as volleyball and basketball. Decision making is based on the provisions of research interprets the results using a qualitative scale.

In children and adolescents, BMI is measured based on their age (BMI/A) because changes in age result in changes in body composition and density. The results of the assessment of the nutritional status of respondents by measuring BMI use three categories which is overweight, normal and underweight. To get the results of measuring the nutritional status of BMI, the height and weight of the respondents were measured.

**Table 5.** Tabulation of Nutritional Status Assessment based on BMI Calculations

Nutritional Status		n	%
BMI	Overweight	36	13
	Normal	189	68.3
	Underweight	52	18.7
Total		277	100.0

Source : Primary Data (2023)

Based on the nutritional status assessment tabulation using BMI calculations, it was found that 36 respondents had overweight nutritional status, 189 respondents had normal nutritional status and 52 respondents had underweight nutritional status.

**Table 6.** Frequency Distribution and Percentage of Respondents based on Nutritional Status

Lifestyle	n	%
Abnormal	88	31.8
Normal	189	68.2
Total	277	100.0

Source : Primary Data (2023)

The dependent variable in this study has three categories which are divided into thin, normal and fat categories but due to data processing using logistic regression data analysis which requires the dependent variable to have a categorical data scale using two categories, the nutritional status variable uses dummy variables, namely nonmetric scale variables or categorical. If there is a dichotomous or categorical scale variable, it must be expressed using the regression model as a dummy variable with a code of 0 or 1.

The k-1 formula determines the number of categories, and the codes used are 1 and 0. All respondents who fit the category, namely normal nutritional status, were coded 1, while those who did not fit the category, namely abnormal nutritional status, were coded 0. Table 5 shows nutritional status with the normal category as many as 189 students (68.2%) with BMI measurement values in the normal category, and nutritional status with an abnormal category, namely 88 female students (31.8%).

### 3.2 Bivariate Analysis

This bivariate analysis was applied in order to be able to carry out tests between independent variables, namely lifestyle and knowledge, as well as nutritional status as the dependent variable. The Chi-Square calculation results obtained will be compared to the Chi-Square table in degrees of freedom and certain significance to answer the hypothesis. If Chi-Square count  $\geq$  Chi-Square table, then  $H_0$  is rejected or  $H_1$  is accepted indicating that there is a significant effect.

**Table 7.** Knowledge and Nutritional Status Test Results

	r	df	p-value
Pearson Chi-Square	17.860	1	.000
Continuity Correction	16.603	1	.000
Likelihood Ratio	17.022	1	.000
N of Valid Cases	277		

With a significance level of  $\alpha = 0.05$ , the results of the Chi-square test explain the significance of the p-value of  $0.000 < 0.05$ . This means that there is a significant influence on the level of knowledge of adolescents and the nutritional status of adolescents in Singosari District.

**Table 8.** Lifestyle and Nutritional Status Test Results

	r	df	p-value
Pearson Chi-Square	16.127	1	.002
Continuity Correction	12.849	1	.000
Likelihood Ratio	14.123	1	.000
N of Valid Cases	277		

The Chi-square test explains that the p-value is  $0.002 < 0.05$ . This means that there is a significant influence on the lifestyle of female adolescents and the nutritional status of female adolescents in Singosari District.

### 3.3 Multivariate Analysis

Researchers applied multivariate logistic regression analysis in order to be able to assess a number of variables that have an influence on the nutritional status of female adolescents in Singosari District. The validity of the feasibility of the regression model was tested with Hosmer and Lemeshow's Goodness of Fit Test and was measured using the Chi-square results. If the p-value  $\leq 0.05$ , there is a significant difference between the model and the observation value, then the model is not feasible and cannot be applied in predicting the observation value. Conversely, if the p-value  $\geq 0.05$ , it means that there is no difference in significance from the model and data or it can be stated that the model is feasible and can be applied in predicting the value of observations.

**Table 9.** Hosmer and Lemeshow's Goodness of Fit Test Results

Chi-square	df	p-value
.692	2	.708

Based on the results of the Hosmer and Lemeshow's Goodness of Fit Test, the Chi-square result was 0.692 and the significance level was  $0.708 > 0.05$ , so the conclusion was that there was no difference in the significance of the model and data so that the regression model used was considered feasible and could be used to predict the value of observations.

Wald test is a analysis test that is partially applied in research. This statistical test was carried out in order to see significant independent variables in the dependent variable. And the  $\alpha = 0.05$ , if the p-value  $< 0.05$  then  $H_0$  is rejected or there is a significant influence from the independent variable with the dependent. Meanwhile, if the p-value  $> 0.05$  then  $H_0$  is accepted or there is no significant effect of the independent variable with the dependent variable.

**Table 10.** Omnibus Tests of Model Coefficients (Overall Test)

		Chi-square	df	p-value
Step 1	Step	18.616	2	.000
	Block	18.616	2	.000
	Model	18.616	2	.000

It is known that the Chi-square value is 18.616 with a p value of 0.000 which has 95% confidence, so there is at least one independent variable that has a significant influence on the dependent variable. And it was concluded that the regression model can be used in further analysis.



**Table 11.** Wald Test Results

		B	S.E.	Wald	df	Exp(B)	p-value
Step 1 <sup>a</sup>	Knowledge	1.229	.295	17.327	1	3.419	.000
	<i>Lifestyle</i>	.374	.299	16.556	1	1.453	.002
	Constant	-1.850	.671	17.597	1	.157	.006

The SPSS output shows that the knowledge and lifestyle variables significantly influence the dependent variable with a Wald value of 17.327 and 16.556 and a significance value of  $0.000 < 0.05$  for the knowledge variable and  $0.002 < 0.05$  for the lifestyle variable. This is in accordance with the output table on the Overall Tests which states, at least there is one independent variable that significantly influences the dependent variable. From a trust of 95%, it means that knowledge and lifestyle variables significantly affect the dependent variable.

According to the statistical test results shown in table 10, the following form of the logistic regression model equation is obtained:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

$$\text{Female Adolescents Nutritional Status} = -1,850 + 1,229 \text{ Knowledge} + 0,374 \text{ Lifestyle}$$

Based on the regression equation above, it can be interpreted that:

The value of the constant ( $\alpha$ ), namely -1.850, indicates that if the value of the knowledge and lifestyle variables is equal to zero or there are no independent variables that affect it, then the value of the dependent variable, namely nutritional status, is -1.850. In this case the interpretation of the constant value ( $\alpha$ ) will lead to an unreasonable conclusion that an individual who has zero knowledge and lifestyle will have a nutritional status of -1.850. Because the regression model equation is used to predict (Y) based on the change in value ( $X_1$  and  $X_2$ ) then the concern is the value ( $X_1$  and  $X_2$ ).

The coefficient value on the knowledge variable ( $X_1$ ) is positive, namely 1.229. If knowledge ( $X_1$ ) increases by 1 score, nutritional status (Y) will increase by 1.229. This indicates that there is an influence between knowledge and nutritional status. So the higher the knowledge, the nutritional status will also be high.

The efficiency value of the lifestyle variable ( $X_2$ ) is positive, namely 0.374. If lifestyle ( $X_2$ ) increases by 1 score, nutritional status (Y) will increase by 0.374. This indicates that there is an influence between lifestyle and nutritional status. So the higher the lifestyle, the higher the nutritional status.

## 4 Discussion

The majority of respondents in this study were 17 years old with a total of 127 female students (45.8%) and at least 18 years of age as many as 35 female students

(12.6%). The results of the primary data are in line with the 2018 Riskesdas data which stated that 6.8% of adolescents aged 16-18 years had a thin nutritional status in East Java Province and vice versa 11.3% of adolescents aged 16-18 years had an obese nutritional status.

The results of the research on the knowledge level of female adolescents showed that as many as 210 female students (75.8%) of the 277 respondents had a good level of knowledge. The quantity of knowledge affects the quality of food digested and one's lifestyle. Lack of understanding about nutrition can reduce a person's ability to utilize nutritional information resulting in inappropriate food consumption.

Based on the results of the study, it was found that of the 277 respondents in the lifestyle variable who had a high percentage, there were 192 female students (69.3%) in the low level category, and conversely, there were 85 female students (30.7%) in the high level category. Diet, physical activity and sleep duration are several aspects of adolescent lifestyle that have a significant effect on adolescent nutritional status.

Based on BMI calculations, normal nutritional status had the highest frequency of occurrence, amounting to 189 female adolescents (68.3%). While the occurrence of the least frequency was found in the nutritional status category of overweight as many as 36 female adolescents (13%). Then as many as 52 female adolescents (18.7%) had a underweight nutritional status.

#### **4.1 The Effect of Knowledge on the Female Adolescents Nutritional Status**

Based on the results of the frequency distribution analysis test, the results showed that the majority of female adolescents had knowledge of good nutrition with a percentage of 75.8% for a total of 210 female adolescents. With a significance level of  $\alpha = 0.05$ , the results of the Chi-square test explain that there is a p-value of  $0.000 < 0.05$ . This means that there is a significant influence between the level of knowledge of adolescents and the nutritional status of adolescents in Singosari District.

This explains that the majority of adolescents have good knowledge because the majority of adolescents provide answers to the research questionnaire correctly, but there are still female adolescents who have less knowledge. This is because even though the object is the same, each respondent has different knowledge. Education, multimedia, environment and experience are some of the factors that influence one's knowledge. The lack of knowledge of adolescents can be caused by the lack of sources of information about nutrition for adolescents in their surroundings.

The relationship between nutritional knowledge and consumption patterns can be seen from the good knowledge of nutrition, which will lead to good nutritional intake and vice versa. This relates to the theory which states that the level of one's nutritional knowledge will influence behavior and attitudes towards the choice of food consumed. Errors in food selection and lack of understanding of nutrition can lead to nutritional problems that affect nutritional status.

Nutritional knowledge possessed by a person can well inform the selection of foods that can be adapted to the state of the body. If the body gets the nutrition according to its needs, a person will have a good nutritional status. Undernourished status can be experienced when the body lacks one or more nutrients than is needed by the body, and

more nutritional status can be experienced when the body receives nutrients in excess levels. Undernutrition or excess nutritional status has the potential to cause negative impacts, such as anemia and degenerative diseases. This research is in accordance with the findings from Mulyati in 2019 stating that there is a significant relationship between the level of knowledge and nutritional status of female adolescents.

#### **4.2 The Effect of Lifestyle on the Female Adolescents Nutritional Status**

Based on the results of the frequency distribution analysis test, the results showed that the majority of teenagers had a low lifestyle with a percentage of 69.3%, a total of 192 female adolescents. With a significance level of  $\alpha = 0.05$ , the results of the Chi-square test explain the p-value of  $0.002 < 0.05$ . This means that there is influence from the lifestyle of adolescents and the nutritional status of adolescents in Singosari District which is significant.

Diet, physical activity and sleep duration are the lifestyle types chosen in this study. A healthy and balanced diet has a significant impact on the growth and development of adolescents. Improper eating behavior is an important factor in causing the problem of undernutrition. Normal nutritional status shows that the body's needs have been met according to the body's capacity. Adolescents who experience malnutrition are more likely to contract infectious diseases, while adolescents who are obese are more likely to develop degenerative diseases. Obesity or overweight in adolescents is caused by an imbalance in the number of calories consumed and energy expended, this causes their movement skills to tend to be stiff and not agile. Conversely, adolescents with underweight nutritional status, namely an imbalance between energy entering and leaving the body, the energy that comes out is greater so that the lack of energy reserves in the body causes the body to become weak and had low immune.

Physical activity is one of the factors that has effects on nutritional status. Excessive caloric intake combined with insufficient energy expenditure will result in weight gain. Excess energy due to low physical activity can increase the risk of obesity. Regular physical activity in the form of sports can help improve health. The intensive learning process every day, as well as the demands of assignments that must be completed on time cause children to feel tired at school, so they are lazy to do physical activities or exercise at home, they prefer to use their free time from school and home assignments for entertainment facilities such as using gadgets.

One of the factors that affect sleep quality is sleep duration. A good night's sleep is sleep of sufficient duration and according to the body's needs. Sleep duration can affect nutritional status. One example is in the case of obesity, short sleep duration which causes increased fatigue results in a decrease in energy expenditure resulting in an increase in calorie intake. Obesity refers to hormonal and metabolic changes that contribute to weight gain. Obesity occurs due to an increase in the hormone ghrelin and a decrease in the hormone leptin which causes an increase in hunger and appetite.

The limitation in this study is that it only looks at nutritional status based on BMI calculations so that it is considered not to optimize the results of the research

conclusions. Another limitation is that the study involved a limited number of subjects, so the findings cannot be extrapolated or generalized to a large number of subject groups.

## 5 Conclusion

Based on the research conducted, it can be concluded that the nutritional status of female adolescents in Singosari District is included in the normal category but there are still female adolescents with underweight and overweight nutritional status. The nutritional knowledge of female adolescents is in the good category, but the lifestyle of teenagers is still in the low category. Knowledge and lifestyle are factors that influence the nutritional status of adolescents. It can be seen that if female adolescents have good knowledge and a high lifestyle, their nutritional status will also be normal, whereas if teenagers have less knowledge or a low lifestyle and vice versa, the nutritional status is not necessarily abnormal, this is due to the possibility of other factors that can affect the nutritional status of adolescents. , but if knowledge is lacking accompanied by a low lifestyle, the nutritional status will be abnormal. Suggestions for further research need to be considered to examine other factors that have a role in influencing the nutritional status of female adolescents and need to be supported by other anthropometric measurements in order to optimally describe the nutritional status of adolescents. As well as the use of other nutritional status measurements if athletes or sportsmen are found as research subjects.

## Author's Contribution

CKY conduct research and compile research results in the form of a thesis. SK provides input and suggestions for the improvement of the thesis. END provides input analyzed data and suggestions for the improvement of the thesis.

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## References

1. Adiyanti, M. G., & Sofia, A. 2013. "Hubungan Pola Asuh Otoritatif Orang Tua dan Konfirmatas Teman Sebaya terhadap Kecerdasan Moral."
2. Adnyani. 2012. "Hubungan Status Gizi dengan Siklus Menstruasi Pada Remaja Putri Kelas X di SMA PGRI 4 Denpasar." *Jurnal Keperawatan*. Fakultas Kedokteran Universitas Udayana Bali 9-18.
3. Arikunto. 2006. *Prosedur Penelitian: Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.
4. Badan, Pusat Statistik. 2022. "Jumlah Sekolah dan Siswa Kecamatan Singosari, 2018-2022." BPS Kabupaten Malang.

5. Damayanti, Adelina Elisa. 2016. "Hubungan Citra Tubuh, Aktivitas Fisik dan Pengetahuan Gizi Seimbang dengan Status Gizi Remaja Putri." Skripsi.
6. Dhillon, J., B. A. Craig, H. J. Leidy, A. Jacobs, B. L. Jones, and C. L. Keeler. 2016. "The Effect of Increased Protein Intake on Fullness: A Meta Analysis and It Limitations." *Journal of the Academy of Nutrition and Dietetics* 968-983.
7. Evans, E. W., P. F. Jacques, G. E. Dallal, J. Sacheck, and A. Must. 2015. "The Role of Eating Frequency on Total Energy Intake and Diet Quality in a Low Income, Racially Diverse Sample of Schoolchildren." *Public Health Nutrition* 474-481.
8. Fitriani, Rika, Lintang Purwara Dewanti, Mury Kuswari, Nazhif Gifari, and Yulia Wahyuni. 2020. "Hubungan antara Pengetahuan Gizi Seimbang, Citra Tubuh, Tingkat Kecukupan Energi dan Zat Gizi Makro dengan Status Gzi pada Siswa." *Gorontalo Journal Health and Science Community*, Vol. 4, No. 1 29-38.
9. Global, School Based Student Health Survey. 2016. "Global Health Observatory Data Repository: Global and regional Trends." UN Regions.
10. Hartaningrum, Putu Intan, Ni Ketut Sutiari, Desak Putu Yuli Kurniati, and Vennesa Susanto. 2020. "Korelasi Sedentary Lifestyle, Durasi Tidur dan Asupan Gizi dengan Status Gizi Remaja." *Jurnal Penelitian dan Kajian Ilmiah Kesehatan*.
11. Katmawanti, Septa, Retno Pembayun, Divaberta Rahma, and Salsabila Ayu. 2022. "Pengaruh Seks Bebas di Kalangan Remaja: Studi Literature Review." *Prosiding Seminar Nasional "Sport Health Seminar with Real Action"*.
12. Katmawanti, Septa, Supriyadi, and Inung Setyorini. 2019. "Hubungan Pola Makan dan Aktivitas Fisik dengan Status Gizi Siswi Kelas VII SMP Negeri (Full Day School)." *Preventia: The Indonesian Journal of Public Health* 63-74.
13. Kemenkes, RI. 2018. "Direktorat Pencegahan dan Pengendalian Penyakit Tidak Menular."
14. —. 2010. *Standart Antropometri Penilaian Status Gizi*.
15. —. 2010. *Standart Antropometri Penilaian Status Gizi*.
16. Kesehatan Provinsi Jawa Timur, Dinas. 2020. "Profil Kesehatan."
17. Khairiyah, E. L. 2016. "Pola Makan Mahasiswa Fakultas Kedokteran dan Ilmu Kesehatan (FKIK) UIN Syarif Hidayatullah." *UIN Syarif Hidayatullah*.
18. Mulyati, Hepti. 2019. "Hubungan Citra Tubuh, Aktivitas Fisik, dan Pengetahuan Gizi Seimbang dengan Status Gizi Remaja Putri." *CHMK Midwifery Scientific Journal* 22.
19. Mulyati, Hepti, Ahmil, and Lastris Mandola. 2019. "Hubungan Citra Tubuh, Aktivitas Fisik, dan Pengetahuan Gizi Seimbang dengan Status Gizi Remaja Putri." *CHMK Midwifery Scientific Journal*.
20. Notoatmodjo, S. 2014. "Ilmu Perilaku Kesehatan." Jakarta: PT. Rineka Cipta.
21. Notoatmodjo, Soekidjo. 2010. *Metodologi Penelitian Kesehatan*. Jakarta: Rineka Cipta.
22. Nurbaeti, Tayong SIti, and Siti Nurayu Barizah. 2019. "Status Gizi Remaja di SMKN 1 Indramayu." *Jurnal Pengabdian Kepada Masyarakat* 31-42.
23. Nurhasim. 2013. "Tingkat Pengetahuan tentang Perawatan Gigi Siswa Kelas IV dan V SD Negeri Blengorwetan Kecamatan Ambal Kabupaten Kebumen Tahun pelajaran 2012/2013."
24. Nursalam. 2011. *Konsep dan Penerapan Metodologi Penelitian Ilmu Keperawatan*. Jakarta: Salemba Medika.
25. Rahayu, Tri Budi, and Fitriana. 2020. "Hubungan Pola Makan dengan Status Gizi Remaja Putri di SMA Negeri 1 Bangalipuro." *Jurnal Kesehatan Samodra Ilmu*.
26. Riskesdas, Kesehatan. 2018. "Hasil Utama Riset Kesehatan Dasar (RISKESDAS)." *Journal of Physics A: Mathematical and Theoretical*.
27. Sulistyoningsih, Hariyani. 2014. "Analisis Pengetahuan, Pola Makan dan Status Gizi Remaja Siswa SMP di Singaparna." *Jurnal Kesehatan Bidkesmas Respati*. 55-66.
28. Supariasa. 2016. "Ilmu Gizi Teori dan Aplikasi." Jakarta: Penerbit Buku Kedokteran EGC.

29. Suresh, N., and R. L. Reddy. 2017. "Effect of Lifestyle on Body Fat Percentage and Visceral Fat in Indian Women with Above Normal Body Mass Index." *Int J Cur Res Rev* 1-5.
30. Taveras, E. M. 2012. "Short Sleep Duration: Association with Childhood Obesity." Boston (USA): Harvard Medical School.
31. UNICEF. 2017. "Levels and Trends in Child Malnutrition." Geneva: WHO, World Bank Group.
32. Wardlaw, G. M., and S. H. Jeffrey. 2007. *Perspectives in Nutrition*. Seventh Edition. New York: McGraw Hill Companies Inc.
33. WHO. 2014. "Health for the World's Adolescents: A Second Chance in the Second Decade." World Health Organization Departement of Noncommunicable disease surveillance.
34. Wiranata, Adiwidya, Hartati Eko Wardani, and Septa Katmawanti. 2020. "Gambaran Status Gizi Siswa Kelas VII di Sekolah Menengah Pertama Negeri." *Sport Science and Health* 67-77.
35. Wulandari, Annisa, Irfan Sudrajat, Kartika Agustika, Muhammad Fadli Pribadi, Riska Delyana, Siti Atiqa, and Ade Saputra Nasution. 2019. "The relationship between the level of nutritional knowledge and nutritional status of students at Ibn Khaldun University Bogor." 18-21.
36. Yuliana, Erlin. 2017. "Analisis Pengetahuan Siswa tentang Makanan yang Sehat dan Bergizi Terhadap Pemilihan Jajanan di Sekolah."

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