

## Application of the general message of balanced nutrition during the pandemic coronavirus disease 2019 (COVID-19) in Mataram City

Luh Putu Prema Wadhani<sup>1\*</sup>, Nani Ratnaningsih<sup>2</sup>

### ABSTRACT

**Background:** Coronavirus Disease 2019 (COVID-19) in 2020 became the limelight worldwide, including in Indonesia. Infection caused by this virus can be prevented by social distancing, physical distancing, and a healthy lifestyle. Maintaining nutritional intake by implementing balanced nutrition guidelines is very important to enhance the immune system.

**Objectives:** This study aimed to determine the description of the application of balanced nutrition guidelines during the COVID-19 pandemic in the community in Mataram City.

**Materials and Methods:** This research was a descriptive study with a survey approach, and the data taken were cross-sectional. This research was conducted in May-June 2020 in the community in the Mataram City taken by purposive sampling with inclusion criteria, namely women and men of productive age, domiciled in the city of Mataram, married status, and at least elementary school education. Respondents in this study were 460 respondents who were calculated using the Slovin formula. Data on the application of balanced nutrition guidelines were obtained using a questionnaire. Data from the results of this research were analyzed using descriptive methods.

**Results:** There are as many as >90% of the community has implemented a general message of balanced nutrition in addition to the fifth message. As many as 89.9% of respondents did not apply the fifth general message of balanced nutrition in limiting consumption of sweet, salty, and fatty foods. The majority of applications >50% of general messages of balanced nutrition were applied by respondents aged 21-29 years, female, high education and work status.

**Conclusions:** The application of the general message of balanced nutrition during the epidemic COVID-19 in Mataram City was implemented optimally, but this application was not carried out in the fifth message in limiting consumption of sweet, salty, and fatty foods.

**Keywords:** COVID-19; Application; General Message for Balanced Nutrition

### BACKGROUND

In early 2020, various parts of the world including Indonesia were shocked by the pandemic caused by the Coronavirus Disease 2019 (COVID-19). Coronavirus disease 2019 (COVID-19) is a disease caused by the acute respiratory syndrome coronavirus (SARS-CoV-2). On March 11, 2020, the World Health Organization (WHO) declared the Coronavirus outbreak in 2019 to be a pandemic<sup>1</sup>. This is because this disease has rocked more than 200 countries in various parts of the world including Indonesia. In Indonesia, on June 18, 2020, there were 42.762 cases infected with this virus with a cure rate of 39,3%<sup>2</sup>, while in West Nusa Tenggara Province there were

1.022 cases infected by this virus. This happened because the spread of Coronavirus Diseases 2019 was relatively fast and difficult to detect<sup>3</sup>. Various efforts have been recommended to cut the spread of the virus through social distancing and physical distancing so that all activities such as work, discussions, and meetings are normally carried out online<sup>4</sup>.

The restrictions that occur during the pandemic have an impact on the decline in the economy, food availability, nutritional intake, and people's lifestyle. Efforts and strategies continue to be made by the government to stabilize this condition, either by providing direct cash assistance or providing food supplies<sup>1</sup>. Availability of foodstuffs, a healthy

<sup>1</sup> Family Welfare Education, Postgraduate Programme Yogyakarta State University  
Jl. Colombo No.1 Karang Malang, Caturtunggal, Sleman, Yogyakarta 55281, Indonesia.

<sup>2</sup> Culinary Art Education Programme, Faculty of Engineering, Yogyakarta State University.  
Jl. Colombo No.1 Karang Malang, Caturtunggal, Sleman, Yogyakarta 55281, Indonesia.

\*Correspondence: [luhputu.2018@student.uny.ac.id](mailto:luhputu.2018@student.uny.ac.id), Tlp. 081246130703.

lifestyle, and fulfillment of balanced nutritional intake are now things that need to be prioritized and carried out optimally. However, as before known, the problem of unhealthy food consumption habits among Indonesians including West Nusa Tenggara Province before the COVID-19 pandemic is still quite high and has not been resolved optimally. This showed in the results of the 2018 Basic Health Research in West Nusa Tenggara Province which noted that as many as 7.1% of the people did not consume fruits and vegetables, 31.2% had less activity, 53.1% did not wash their hands properly, > 30% consuming sweet and fatty foods and 10% with the habit of consuming salty foods<sup>5</sup>. The application of general guidelines for well-balanced nutrition during the COVID-19 pandemic plays an important role in the health of the body. Fulfilling the need for micronutrients, micro (micronutrients), food safety, physical activity and adequate water consumption in the body can help the hormones forming, leukocytes, immunoglobulins, and lymphocytes in the immune system improving the function of the heart, lungs and maintaining balance in the body during the COVID-19 pandemic<sup>6</sup>.

According to the Indonesian Ministry of Health (2020), the infection caused by the Coronavirus in 2019 has an impact on increasing body temperature, so that compliance of balanced and healthy nutritional intake tends to increase to support the immune system. The adoption of unhealthy eating habits and lifestyles by not washing hands properly, unbalanced food consumption, and inadequate physical activity during the pandemic will have an impact on decreasing the body's defense system and increasing viral infections. Therefore, understanding and implementing a healthy lifestyle that refers to the guidelines for well-balanced nutrition is the main asset for obtaining a healthy, strong body defense and avoiding various diseases caused by viruses during the COVID-19 pandemic<sup>7</sup>.

Previous research has shown that the majority of toddler mothers in Babakan District do not apply the four pillars of balanced nutrition obtained by using the interview method<sup>8</sup>. However, further, in this study, research will be carried out about the description of the application of general guidance for balanced nutrition in more detail on the application of 10 general messages of balanced nutrition, especially during the COVID-19 pandemic. The application of the general message of balanced nutrition is obtained

by using a questionnaire in the form of scoring on each general message of balanced nutrition. The goal of this research is that people notice and apply a healthy lifestyle based on balanced nutrition guidelines in their daily life. In addition, it is also hoped that health workers and the government will continue to give education and socialization about general guidance for balanced nutrition to improve the health status of the community. This study aims to describe the application of balanced nutrition guidelines during the COVID-19 pandemic in the people of Mataram City, West Nusa Tenggara.

## **MATERIALS AND METHODS**

This research was a descriptive study using a survey approach method. This research was conducted from May to June 2020 in Mataram City, West Nusa Tenggara. The populations in this study were all people in West Nusa Tenggara Province with the number of respondents calculated using the Slovin formula ( $\alpha = 5\%$ ) as many as 460 respondents. The sampling technique in this study was carried out by using purposive sampling with inclusion criteria consisting of women and men of productive age, live in Mataram city, married and or have been married and at least primary school education. Data on the application of balanced nutrition general messages were collected using a questionnaire for the application of 10 general messages of balanced nutrition which were applied during the COVID-19 pandemic with the help of google form media. The questionnaire used in this study refers to a balanced nutrition behavior questionnaire with a Cronbach  $\alpha$  reliability value of 0.725 and has been valid [9]. The general message of balanced nutrition contained in this study consists of (1) being grateful and enjoying the diversity of food, (2) consuming lots of vegetables at least 3 times a day and consuming fruit at least 2 times a day, (3) get used to consuming side dishes that contain high protein, (4) get used to consuming a variety of staple foods, (5) limit consumption of sweet, salty and fatty foods, (6) get used to breakfast, (7) get used to drinking enough and safe water in the amount of 8 glasses or  $\pm 2$  liters per day, (8) getting used to reading labels on food packaging, (9) washing hands with soap and running water and, (10) doing adequate physical activity and maintaining a normal body

weight with a duration of activity and exercise as much as 30 minutes per day. The data obtained from the results of this study were analyzed descriptively on each general message in the guidelines for balanced nutrition.

**RESULTS**

**Respondent Characteristics**

Data on the characteristics of respondents in this study consisted of age, gender, education, and occupation. The results of this research show that most of the respondents in this research were in the age range 21-29 years and were female. In terms of education, most of the respondents are at the middle level with a working status. The data on the characteristics of respondents in this research can be seen in Table 1.

**Application of The General Message of Balanced Nutrition**

Data collection on the application of balanced nutrition general messages in this research refers to 10 general messages of balanced nutrition in the balanced nutrition guidelines regulated by the Ministry of Health of the Republic of Indonesia in 2014. The application data for balanced nutrition general messages are categorized in the category of applied and not applied. The applied category is given to respondents who apply according to the instructions on every general message of balanced nutrition, while in the not applied category it is given to respondents who do not apply according to the instructions in every general message of balanced nutrition. The results of application 10 general messages on balanced nutrition in the guidelines for balanced nutrition can be seen in Table 2.

**Table 1. Respondent Characteristics**

Category	n	%
<b>Age</b>		
≤ 20 years	75	16,3
21 - 29 years	238	51,7
30 – 49 years	142	30,9
> 49 years	5	1,1
<b>Sex</b>		
Male	155	25,0
Female	345	75,0
<b>Education</b>		
Primary	7	1,6
Middle	80	17,4
Higher	373	81,0
<b>Work Status</b>		
Work	316	68,7
Not Work	144	31,3

Based on the results of the analysis in Table 2 it is known that during the COVID-19 pandemic 449 (97.6%) respondents had applied the general message of balanced nutrition in being grateful and enjoying a variety of foods. The application of getting into the habit of consuming vegetables and fruit also shows that most of the 454 (98.7%) respondents have adopted the habit of consuming vegetables and fruit every day. This happened because most respondents said that during the COVID-19 pandemic respondents gained a lot of knowledge from various information sources that advocated a healthy lifestyle with enough consumption of fruits and vegetables to maintain

endurance and avoid viruses and various diseases, besides that the habit of consuming fruits and vegetables has also become a habit that has been done before, but during this pandemic, the consumption of fruits and vegetables has increased.

The general message of balanced nutrition on the habit of consuming side dishes that contain high protein and the habit of consuming a variety of staple foods has mostly been applied as many as 456 (99.1%) and 454 (98.7%) respondents have applied this general message. This is because most respondents said that the availability of high protein and staple foods such as chicken, sea fish, rice, noodles, and bread in West

Nusa Tenggara Province is quite available and easy to find in traditional markets and other shopping centers so that access to these foods is easy to get. Respondents did not apply restrictions on consuming sweet, salty, and fatty foods during the COVID-19 pandemic. As many as 98.9% of respondents are accustomed to consuming sweet, salty, and fatty foods, so the general message of balanced nutrition in

getting used to limiting consumption of sweet, salty, and fatty foods is not applied. Most of the reason respondents did not apply this message was that it had become a habit. Sweet foods that are often consumed include syrup, flavored drinks, jam, candy, and the use of sugar, salty foods can be salted fish and salted eggs, while fatty foods consumed are fried and fast food.

**Table 2. Application of 10 General Messages on Balanced Nutrition in The Guidelines for Balanced Nutrition**

General Messages on Balanced Nutrition	Application				Total	
	Applied		Not Applied		n	%
	n	%	n	%		
1. Being grateful and enjoying the diversity of food	449	97,6	11	2,4	460	100
2. Consuming vegetables and fruit	454	98,7	6	1,3	460	100
3. Consuming side dishes that contain high protein	456	99,1	4	0,9	460	100
4. Get used to the consumption of a variety of staple foods	454	98,7	6	1,3	460	100
5. Limit consumption of sweet, salty and fatty foods	5	1,0	455	98,9	460	100
6. Get used to breakfast	450	97,8	10	2,2	460	100
7. Get used to drinking enough and safe water	446	96,9	14	3,1	460	100
8. Get used to reading labels on food packaging	445	96,7	15	3,3	460	100
9. Get used to washing hands with soap and running water	458	99,6	2	0,4	460	100
10. Doing enough activity and maintaining a normal body weight	421	91,3	39	8,6	460	100

The habit of drinking enough and safe drinking water of ± 8 glasses (2 liters) during the COVID-19 pandemic has been implemented by 446 (96.9%) respondents in this study, this habit has also been practiced before the COVID-19 pandemic. In addition to the habit of drinking enough and safe water, breakfast habits have also been carried out during this pandemic as many as 450 (97.8%) of respondents have adopted the habit of having breakfast. This happens because most respondents said that the habit of eating breakfast is done because to maintain a healthy lifestyle and this breakfast habit accidentally occurs because all activities and work are done at home so that the opportunity to have breakfast can be done.

Judging from the application of the general message of balanced nutrition in the habit of reading labels on food packaging during the COVID-19 pandemic, it is known that 445 (96.7%) respondents

applied the general message, but a small proportion did not apply it, while in the application it was used to wash their hands using soap, and running water during the COVID-19 pandemic, it is known that most of the 458 (99.6%) respondents applied this general message. In the application of general messages in getting used to doing adequate physical activity and maintaining normal body weight, there were 39 (8.6%) respondents who did not apply this general message during the pandemic. This is because many respondents have the reason that office work and online assignments and meetings make physical activity limited.

Data on the application of the general message of balanced nutrition were also analyzed descriptive based on the characteristics of the respondents consisting of age, gender, education, and occupation. The application of this balanced nutrition general message is categorized in the category of applying

message, apply 50% of messages, and didn't apply the message. The category of applying messages is given to respondents if they have applied >50% - 100% or 6-10 messages of balanced nutrition according to the advice, while in the category of applying 50% of the messages are given to respondents if they have applied 50% of messages or 5 of 10 general nutritional messages balanced according to recommendations and the category of not applying message is given to the respondent if they do not apply the 10 general messages of balanced nutrition according to the advice. The results of descriptive analysis of the application of the general message of balanced nutrition based on the characteristics of the respondent during the COVID-19 pandemic can be seen in Table 3.

Based on the results of the analysis in Table 3, it shows that the majority of respondents who applied the general message of balanced nutrition during the COVID-19 pandemic were in the age range of 21-29 years as many as 235 (98.7%) respondents and as many as 6 (8.0%) respondents in ≤ 20 years old who apply 50% of the general message of balanced nutrition. Judging by gender, as many as 341 (9.8%) female respondents applied the general message of fully balanced nutrition, and seen at the education level, most of the higher education levels implemented

the general message of fully balanced nutrition as many 365 (97.8%). The application of the general message of balanced nutrition during the COVID-19 pandemic has also been fully implemented by most respondents with a working status of 140 (97.3%) of respondents.

### DISCUSSION

The infection caused by the coronavirus disease 2019 (COVID-19) causes many life changes, including lifestyle, so that the nutritional balance before and after infection is very important to pay attention to <sup>7</sup>. The implementation of the general guidance for balanced nutrition established by the Ministry of Health of the Republic of Indonesia in 2014 is one way that can be done to improve body health. These guidelines aim to offer behavioral guidelines in consuming food and beverages and living a healthy life. The results of these studies indicate that > 90% of respondents have implemented the general message of balanced nutrition properly during the COVID-19 pandemic except for the fifth message by limiting sweet, salty, and fatty foods. In general, the application of general guidelines for well-balanced nutrition during the COVID-19 pandemic can offer benefits for the health of the body.

**Table 3. Application of Balanced Nutrition General Message based on Respondent Characteristics**

Characteristics	Application						Total	
	Applying Messages		Applying 50% of Messages		Didn't applying Message		n	%
	n	%	n	%	n	%		
<b>Age</b>								
≤ 20 years	69	92.0	6	8.0	0	0	75	100
21 - 29 years	235	98.7	3	1.3	0	0	238	100
30 – 49 years	139	98.6	3	1.4	0	0	141	100
> 49 years	5	100	0	0	0	0	5	100
<b>Sex</b>								
Male	107	93.0	8	7.0	0	0	115	100
Female	341	98.8	4	1.2	0	0	345	100
<b>Education</b>								
Primary	7	100	0	0	0	0	7	100
Middle	76	95.0	4	5.0	0	0	80	100
Higher	365	97.8	8	2.2	0	0	373	100
<b>Job Status</b>								
Work	308	97.5	8	2.5	0	0	316	100
Not Work	140	97.3	4	2.7	0	0	144	100

The habit of consuming a variety of foods, both staple foods, and fruits and vegetables, getting used to breakfast, and reading packaging labels on food during the COVID-19 pandemic, the need for macronutrients, micronutrients, and food safety in the body are met. In addition, the fulfillment of protein intake, physical activity, and adequate water consumption in the body can effectively help hormones forming, leukocytes, immunoglobulins, and lymphocytes which can support the immune system, improve the function of the heart, lungs and maintain balance in the body during the COVID-19 pandemic <sup>10</sup>.

Prevention of deficiency and excess due to nutrition caused by bad food habits and lifestyle during a pandemic requires an understanding and application of good nutrition with the principle of balanced nutrition <sup>11,12</sup>. In general, actions in the application of food consumption and healthy living carried out by each person will pass through various stages including response, mechanism, and adaptation <sup>13</sup>. The difference that occurs in each action is consuming everyone's foods is strongly influenced by the presence of internal factors and external factors. Psychological conditions, availability of foodstuffs, and the area of residence are risk factors for changes in eating behavior for everyone <sup>14</sup>. This is in line with the application of the general message of balanced nutrition carried out during the COVID-19 pandemic in this study, the psychological state and the availability of food ingredients during this pandemic period have made people pay more attention to a healthy lifestyle that is carried out daily so that body health is maintained. In addition, the government has made an appeal and education to wash hands with soap and clean water as well as improve the clean and healthy lifestyle of the community. However, the application of limiting the consumption of sweet, salty, and fatty foods has not been implemented optimally with >90% of respondents in this study still consuming large amounts, so this is a special concern that needs to be done to maintain a healthier intake.

The limitation made on the consumption of sweet, salty, and fatty foods in the general message of balanced nutrition is an effort to support health. Excessive consumption of sweet, salty, and fatty foods will have an impact on the emergence of various degenerative diseases such as diabetes mellitus, heart disease, and hypertension as well as changes in nutritional status so that with these diseases the body's

defenses will become weak in the face of the virus during the COVID-19 pandemic <sup>15,16,17</sup>. The results of this study show that 98.9% of respondents do not practice limiting their consumption of sweet, salty, and fatty foods. This is in line with the results of the 2018 Basic Health Research which showed that consumption of sweet, salty, and fatty foods respectively was 37.6%, 10.0%, and 32.4%, which are still quite high in West Nusa Tenggara <sup>6</sup>. The emergence of various types of food and beverages on some televisions, shopping centers, habits, preferences, and environmental factors makes it easy to access these foods, thus affecting food consumption. In addition to food restrictions, the application of the habit of washing hands using soap and running water during the COVID-19 pandemic is also highly recommended. Washing hands using soap and running water is one of the efforts that can be done in reducing the spread of the coronavirus, so this application is very important.

In general, food consumption behavior and habits that are implemented by a person are strongly influenced by various factors, including internal and external factors. Internal factors consisting of age, gender, education, and occupation can affect a person's healthy behavior. The age factor can affect the knowledge a person has <sup>18</sup>. With increasing age, it greatly affects the development, needs, and mindset that exists in him, so that this situation affects the habit of implementing the general message of balanced nutrition <sup>19</sup>. The results of these studies indicate that as many as 98.7% of respondents aged 21-29 and gender apply the general message of well-balanced nutrition. One of the perceptions and patterns of thought that exist in each person is greatly influenced by the increase in age. Everyone will play an active role in social life and prepare for the adjustment to old age that occurs at the age of 20 to 35 years. Throughout that age, everyone will tend to spend more time acquiring knowledge, so that intellectual abilities, problem-solving, and knowledge acquisition tend to increase and result in good behavior in everyday life <sup>20</sup>.

The educational factor is one of the tools used to produce a change in a person, therefore through education, a person can find out everything that has not been known before. Education is a process carried out to gain knowledge, understanding, and how to behave according to your needs <sup>21</sup>. The results of this

study show that as many as 365 (97.8%) respondents with a higher education level have implemented >50% of the general message of well-balanced nutrition. This research is in line with research on mothers with children in Manado who reported that mothers who are at the higher education level have knowledge of well-balanced nutrition and will continue to learn and apply this knowledge related to nutrition to their children and their families <sup>22</sup>. In addition, the results of research in South Kalimantan also show that providing education related to good nutrition to a person will improve healthy behavior <sup>23</sup>.

An internal characteristic that factors into a person's behavior is work. The work that is owned by each person influences lifestyle and consumption behavior, including behavior in implementing general guidance for balanced nutrition <sup>15</sup>. The results of this study show that as many as 308 (97.5%) respondents with working status have implemented > 50% general messages of well-balanced nutrition. This research is in line with research at SMK Surabaya which reports that the work factor of parents is one of the factors that can influence food consumption behavior in the household so that the habit of providing and implementing food for each individual and family is very much determined by education, work and income <sup>24</sup>.

## CONCLUSIONS

Based on the results of this research it was concluded that >90% of the people in Mataram City applied the general message of balanced nutrition in the first to fourth messages and the sixth to tenth messages properly during the pandemic period. However, >90% of people in Mataram City do not apply the fifth general message of balanced nutrition, namely limiting the consumption of sweet, salty, and fatty foods. Judging by the characteristics, most of the people aged 21-29 years, female sex, middle education, and work applying >50% general nutrition messages during the COVID-19 pandemic. The application of healthy living habits based on general guidelines for balanced nutrition for both self and family during this pandemic is very necessary to be maintained to support a healthy body. The role of health workers and the government is very much needed to continue to offer education and information related to balanced nutrition to support and become a habit in having a healthy lifestyle.

## REFERENCES

1. Djalante, R., Lassa, J., Setiamarga, D., Sudjatma, A., Indrawan, M., Haryanto, B., Warsilah, H. Review and Analysis of Current Responses to COVID-19 in Indonesia: Period of January to March 2020. *Progress in Disaster Science Journal*: 2020; 6 (100091): 1-9.
2. Kementerian Kesehatan Republik Indonesia. Situasi Covid-19, Kondisi 18 Juni 2020. Kementerian Kesehatan Republik Indonesia; 2020.
3. Sekretariat Daerah Pemerintah Provinsi Nusa Tenggara Barat. Press Release Covid-19. Nusa Tenggara Barat; 2020.
4. Lingam, L., & Suresh, S. R. COVID-19, Physical Distancing and Social Inequalities: are we all Really in This Together. *The International Journal of Community*. 2020; 2(2): 173-190.
5. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI. Laporan Nasional Risdasdas 2018. Jakarta; 2018.
6. Wu, D., Lewis, E. D., Pae, M., & Meydani, S. Nutritional Modulation Of Immune Function: Analysis Of Evidence, Mechanisms, and Clinical Relevance. *Frontiers in Immunology Journal*. 2019; 9(3160): 1-19.
7. Kementerian Kesehatan Republik Indonesia. Panduan Gizi Seimbang Pada Masa Pandemi Covid-19. Jakarta; 2020.
8. Fitri, Z., & Salam, A. Penerapan Pedoman Gizi Seimbang Pada Ibu Balita di Kelurahan Babakan. *Jurnal Gizi Prima*. 2017; 2(2): 148-153.
9. Nuryani. Validitas dan Reabilitas Kuesioner Pengetahuan, Sikap dan Perilaku Gizi Seimbang Pada Remaja. *Jurnal Gizi dan Kesehatan*. 2019; 3(2): 37-46.
10. Kementerian Kesehatan Republik Indonesia. Pedoman Gizi Seimbang. Jakarta; 2014.
11. Pratami, T. J., Widajanti, L., & Aruben, R. Hubungan Penerapan Prinsip Pedoman Gizi Seimbang dengan Status Gizi Mahasiswa S1 Departemen Ilmu Gizi Universitas Diponegoro. *Jurnal Kesehatan Masyarakat*. 2016; 4(4): 561-570.
12. Agustina, & Permatasari, P. Hubungan Pengetahuan dan Penerapan Pesan Gizi seimbang Remaja dalam Pencegahan Anemia Gizi Besi. *Jurnal Ilmiah Kesehatan Masyarakat*. 2019; 11(1): 1-9.

- Application of the general message of balanced nutrition during the pandemic coronavirus disease 2019 (COVID-19) in Mataram City*
13. Perdani, Z. P., Roswita, H., & Nurhasanah. Hubungan Praktik Pemberian Makan dengan Status Gizi Anak usia 5 Tahun di Pos Gizi Desa Tegal Kunir Lor Mauk. *Jurnal KFT*. 2016; 1(2): 17-29.
  14. Stankevich, A. Explaining the Consumer Decision-Making Process: Critical Literature Review. *Journal of International Business Research and Marketing*. 2017; 2(6): 7-14
  15. Adriaansz, P. N., Rottie, J., & Lolong, J. Hubungan Konsumsi Makanan dengan kejadian Hipertensi pada lansia di Puskesmas Ranomuut Kota Manado. *Jurnal Keperawatan*. 2016; 4(1): 1-9.
  16. Anjangsari, K. N., & Isnawati, M. Hubungan Konsumsi Softdrink, lingkar pinggang dan aktivitas fisik dengan kadar glukosa darah puasa pada wanita dewasa. *Jurnal Of Nutrition College*. 2015; 4(2): 162-170.
  17. Soraya, D., Sukandar, D., & Sinaga, T. Hubungan Pengetahuan gizi, tingkat kecukupan zat gizi dan aktivitas dengan status gizi pada guru SMP. *Jurnal Gizi Indonesia*. 2017; 6(1): 29-36.
  18. Rahman, N., Dewi, N. U., & Armawaty, F. Faktor-faktor yang berhubungan dengan perilaku makan pada remaja SMA Negeri 1 Palu. *Jurnal Preventif*. 2016; 7(1): 1-64.
  19. Yusra, V. D., Machmud, R., & Yenita. Faktor-faktor yang berhubungan dengan tingkat pengetahuan wanita usia subur tentang SADARI di Nagri Painan. *Jurnal Kesehatan Andalas*. 2016; 5(3): 697-704.
  20. Silalahi, E., Syarifuddin, & Sudibyo, M. Faktor-faktor yang mempengaruhi terhadap pengetahuan tentang lingkungan pada siswa tingkat SMP/MTs dan SMA/MAN Adiwiyata di Kota Labuhanbatu. *Jurnal Pendidikan Biologi*. 2016; 5(3): 146-153.
  21. Putri, R. M., & Lasri. Pekerjaan, Tingkat Pendidikan dan Pengetahuan Ibu Pra Sekolah tentang Gizi Seimbang. *Jurnal Care*. 2016; 4(3): 78-87.
  22. Wowor, P., Engkeng, S., & Kalesaran, A. F. Faktor faktor yang berhubungan dengan perilaku konsumsi jajanan pada pelajar di Sekolah Dasar Negeri 16 dan Sekolah Dasar Negeri 120 Kota Manado. *Jurnal Kesmas*. 2018; 7(5): 17-23.
  23. Irnani, H., & Sinaga, T. Pengaruh Pendidikan Gizi terhadap pengetahuan, praktik gizi seimbang dan status gizi pada anak sekolah dasar. *Jurnal Gizi Indonesia*. 2017; 6(1): 58-64.
  24. B, V. N., & Wahini, M. Faktor- Faktor yang mempengaruhi pola konsumsi makan remaja (Kasus di sekolah Menenengah kejuruan Negeri 8 Surabaya). *Jurnal Boga*. 2014; 3(3): 47-50.