



The Influence of Android Applications in Nutrition Education on Increasing Adolescent Vegetable and Fruit Consumption Knowledge and Behavior

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Abstract

Pendidikan gizi berperan penting dalam meningkatkan frekuensi konsumsi sayuran dan buah di kalangan remaja. Tujuan dari penelitian ini adalah untuk mengevaluasi pengaruh edukasi gizi yang disampaikan melalui aplikasi Android terhadap perubahan pengetahuan dan sikap terkait konsumsi sayuran dan buah-buahan di kalangan siswa SMPN 8 Semarang. Penelitian ini menggunakan desain kuasi-eksperimental yang menampilkan kelompok *pretest* dan *posttest*. Sampel yang terpilih terdiri dari 40 remaja yang dialokasikan ke dalam Kelompok Eksperimen dan kelompok kontrol. Data dikumpulkan melalui kuesioner yang menilai pengetahuan gizi dan SFFQ (*Semi-Quantitative Food Frequency Questionnaire*), yang digunakan untuk mengukur tingkat konsumsi sayuran dan buah-buahan tertentu. Analisis data dilakukan dengan menggunakan uji Wilcoxon untuk kelompok kontrol dan uji-t berpasangan untuk kelompok percobaan. Penelitian menunjukkan bahwa skor pengetahuan rata-rata pada Kelompok Eksperimen mengalami peningkatan yang signifikan secara statistik dari 81,00 menjadi 115,00 pasca intervensi ($p < 0,001$). Sebaliknya, kelompok kontrol menunjukkan perbaikan minimal dari 12,00 menjadi 12,50 ($p = 0,564$), di antara peserta yang termotivasi, juga terjadi peningkatan konsumsi sayuran yang nyata dari 108,93 gram per hari menjadi 123,12 gram. Sebaliknya, kelompok kontrol tidak menunjukkan perubahan yang signifikan dalam konsumsi buah dan sayuran. Kesimpulannya, aplikasi Android berfungsi sebagai media yang efektif untuk pendidikan nutrisi, secara signifikan meningkatkan pengetahuan dan memodifikasi perilaku diet yang terkait dengan konsumsi sayuran dan buah-buahan di kalangan remaja.

Kata kunci: Pendidikan nutrisi, aplikasi Android, pengetahuan, perilaku konsumsi, sayuran, Buah-buahan, remaja.

Abstract

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Nutrition education is critical in increasing the consumption of vegetables and fruits among adolescents. This study aimed to assess the impact of nutrition education using Android applications on changes in knowledge and attitudes towards vegetable and fruit consumption of students at SMPN 8 Semarang. This study used a quasi-experimental design with pretest and posttest groups. Samples were selected, consisting of 40 adolescents divided into two groups: a treatment group and a control group. Data were collected through questionnaires on nutrition knowledge and SFFQ (*Semi-Quantitative Food Frequency Questionnaire*) forms, which were used to assess the level of consumption of vegetables and fruits. Data were analysed using the Wilcoxon test for the control group and the paired t-test for the experimental group. Results showed that the mean knowledge score in the treatment group increased significantly from 81.00 to 115.00 after the intervention ($p < 0.001$), whereas the control group's score only increased from 12.00 to 12.50 ($p = 0.564$). Among the motivated group, there was also an increase in vegetable consumption from 108.93 grams per day to 123.12 grams. However, the control group showed no significant change in fruit and vegetable consumption. Conclusion: The Android application serves as an effective medium for nutrition education, increasing knowledge and promoting dietary behavior changes that encourage adolescents to consume more vegetables and fruits.

Keywords: Nutrition education, Android app, knowledge, consumption behaviour, vegetable, fruit, adolescent.

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INTRODUCTION

Eating behavior among adolescents is an increasingly worrying health issue, especially related to low consumption of vegetables and fruits, which results in a lack of essential nutrients such as vitamins, minerals, and fiber, which can be a risk to health development and cause various diseases, including hypertension, heart disease, diabetes mellitus, and obesity (Arista et al., 2021; Perdana et al., 2017). According to data from Riskesdas (2018), around 96.8% of children in Indonesia aged 10-14 years do not consume enough vegetables and fruits, and only 3.11% of the population achieves the recommended intake of vegetables and fruits. Consuming enough vegetables and fruits, which is very important in a balanced diet, since the nutrients contained in them serve as protectors against various diseases and are strongly associated with good health status (Perdana et al., 2017).

Adolescence is considered a critical period for establishing a healthy diet. Adolescents are undergoing a critical phase in growth and development, both physically and psychologically. Many studies show that proper nutritional intake regulation during this time can affect their physical growth and long-term health (Haryana et al., 2023; Utami & Kurniasih, 2022). According to the Balanced Nutrition Guidelines, it is recommended that each individual consume at least 3-4 servings of vegetables and 2-3 servings of fruits every day (Latersia et al., 2022). The average daily consumption of vegetables and fruits among adolescents is only 1-2 servings of vegetables and fruits, which suggests that many adolescents have not met the demands of balanced nutrition (Arista et al., 2021).

Factors that affect the consumption of vegetables and fruits among adolescents are very diverse, including social environment, education, food availability, and support from parents and peers (Azrimaidaliza & Purnakarya, 2011; Natsir Djide & Pebriani, 2023). Adequate nutrition education is crucial for increasing adolescents' knowledge and awareness of the importance of consuming vegetables and fruits, which can lay the foundation for a healthy diet. The availability of technology, such as Android-based applications, can also be used as a tool in nutrition education, which has been proven to be able to improve nutrition knowledge, attitudes, and practices among adolescents (Lestari, 2017).

The research, although it has extensively discussed the consumption behavior of vegetables and fruits among adolescents and the effectiveness of nutrition education programs, still primarily employs conventional approaches such as lectures and print media. This approach is less relevant to the characteristics of today's adolescents, who are familiar with digital technology. On the other hand, the use of Android-based applications in nutrition education remains limited, particularly those targeting school-age adolescents. There have not been many studies that specifically evaluate how digital media, such as Food Diary: Diet and Health Log, can improve knowledge and consumption behavior of vegetables and fruits. Therefore, this study aims to fill this gap by empirically examining

the effectiveness of Android applications as a nutrition education medium that is more interactive and adaptive to the needs of today's adolescents.

This research presents a novel approach to nutrition education utilizing Android-based applications, which are still relatively underutilized in Indonesian society, particularly among adolescents. The use of modern technology in nutrition education enables the delivery of nutrition information that is more interactive and engaging, thereby increasing adolescents' compliance with consuming vegetables and fruits. The justification for this research emphasizes the need to adapt nutrition education methods to the daily habits of today's adolescents, who are heavily influenced by technology. By identifying and implementing innovative approaches, this research aims to make a significant contribution to the field of public health, especially in efforts to increase nutritional intake among adolescents.

This research is concerned with the importance of adolescent health in Indonesia, given the large number of adolescents who are at risk of developing health problems due to an unbalanced diet. It is essential to create effective and relevant interventions. The involvement of digital technology in nutrition education through Android applications is seen as one of the innovative solutions that can help adolescents overcome the challenges of maintaining a healthy diet. The goal of this study is to make a meaningful contribution to the development of more effective public health policies and nutrition education programs, thereby enhancing the long-term quality of life and health of adolescents in Indonesia.

With the state of nutrition becoming increasingly a concern among adolescents, educators, parents, and policymakers need to adopt innovative approaches to promote healthy eating. This research is expected to make a significant contribution to public health and provide technology-based solutions to increase the consumption of vegetables and fruits among adolescents.

METHODOLOGY

Types of Research

This study used a quasi-experimental design with a pretest-posttest control group design (Sugiyono, 2017). This design aims to compare the control group, which received nutrition education using PowerPoint, with the experimental group, which received nutrition education on fruits and vegetables using Food Diary: Diet and Health Log, assessing both knowledge and total consumption of fruits and vegetables before and after college.

Research Time and Place

The research is expected to be carried out within three months, within the budget from January to March 2024. SMP N 8 Semarang, the location of the study, was also chosen as a respondent due to the numerous concerns about the low consumption of vegetables and fruits among adolescents, thereby supporting student access and participation in this study.

Research Objectives

The purpose of this study is to examine eighth-grade students of SMPN 8 Semarang. The population here is all 8th-grade students at SMPN 8 Semarang. The population was obtained from a sample of 20 students in the experimental group and 20 students in the control group. Sampling was conducted using purposive sampling with specific inclusion criteria: students aged 11 to 15 years, possessing an Android communication device, and willing to participate as research subjects. The total sample consisted of 40 students, divided into 20 students in the experimental group and 20 students in the control group.

Data Collection Techniques and Instrument Development

The distribution of questionnaires is conducted both offline and online to collect data. The questionnaire consists of two main components: the SFFQ (Semi-Quantitative Food Frequency Questionnaire), a nutritional knowledge questionnaire used to assess consumption of vegetables and fruits over the past two weeks. Nutrition education sessions were conducted both offline and online, twice.

Data Analysis Methods

Data were analyzed using univariate and bivariate analysis. Univariate analysis is used to describe the characteristics of the sample, while bivariate analysis is used to find out the differences between the experimental group and the control group. The statistical test used is the Paired Samples T-test for normally distributed data and is considered significant if $p < 0.05$. This analysis aligns with the research's problems and objectives, which aim to evaluate the impact of nutrition education on the knowledge and consumption of vegetables and fruits among adolescents.

RESULTS AND DISCUSSION

RESULT

Demographic analysis of the research sample is crucial for understanding the basic characteristics of respondents, particularly their age and gender. The sample consisted of 40 adolescents aged 13-16 years with varying distributions. The 13 and 14-year-old age groups dominate, with the highest number of women at 14 years old (25%). The number of respondents decreased at the ages of 15 and 16. Overall, the number of males and females was balanced, 50% of the total sample each, so that the distribution can be seen in the table below:

Table 1. Frequency Distribution of Research Samples

Age (Years)	Gender	<i>f</i>	(%)
13	Man	8	20.0
	Woman	7	17.5
14	Man	6	15.0
	Woman	10	25.0

15	Man	4	10.0
	Woman	3	7.5
16	Man	2	5.0
	Woman	2	5.0
Total		40	100.0

Based on Table 1, it can be seen that at the age of 13, there are 8 males (20.0%) and 7 females (17.5%), while at the age of 14, there are more females (25.0%) than males (15.0%). The number of respondents decreased at ages 15 and 16, with an equal distribution between males and females at age 16 (5.0% each). This distribution reflects a good representation of the adolescent population and gender balance that supports the validity of the study results, after which a parametric test is performed. The parametric test meter is first used to conduct a normality test.

The normality test is an essential step in statistical analysis to check if the data adheres to the distribution normality assumptions that are a prerequisite for many parametric methods, such as t-tests. In this study, the Shapiro-Wilk test was used to assess the normality of the data in the Experimental Group and the control group.

Table 2. Normality Test

	Shapiro-Wilk		
	Statistics	df	Itself.
Treatment	0.912	n = 20	0.568
Control	0.758	n = 20	0.001

Based on Table 2 of the data in the Experimental Group, the Shapiro-Wilk statistical value is 0.912 with a significance value (p) of 0.568, which is greater than 0.05. This indicates that the data in the Experimental Group did not deviate significantly from the normal distribution, thereby meeting the normality assumption. In contrast, the Shapiro-Wilk statistical value in the control group was 0.758, with a significance value of 0.001, which is smaller than 0.05. This means that the data in the control group does not have a normal distribution, and the assumption of normality is rejected.

Table 3. The Influence of Nutrition Education on Knowledge of Vegetables and Fruits

Treatment	n	rerata±sb	average difference (IK95%)	p
Pretest	20	12.50 ± 2.10	4,8(6.25 ± 1.50)	0,001
Posttest	20	18.75 ± 2.50		

Based on table 3 above, the data in the Experimental Group shows that nutrition education has been proven to be effective in increasing knowledge about vegetables and fruits in the Experimental Group with the media of the Android-based Food Diary: Diet and Health *Log* application on knowledge of vegetables and fruits with an average difference of 4.8 statistically significant (p = 0.001), showing a noticeable increase in knowledge after the intervention.

Table 4. The Influence of Nutrition Education on Knowledge of Vegetables and Fruits

Control	n	median (min-max)	rerata±sb	p
Pretest	20	13 (10-17)	13.00 ± 2.50	0.050
Posttest	20	14(11-18)	14.00 ± 2.00	

Based on Table 4 above, the average control group showed no significant difference in knowledge about vegetables and fruits compared to the average understanding of the control group, as indicated by the PowerPoint presentation, which yielded a *p-value* of 0.032. The data showed no significant improvement in knowledge following the implementation of the intervention.

The impact of the intervention on the consumption of fruits and vegetables by the experimental group allowed comparison with actual measurements. This includes the average consumption of fruits and vegetables, along with their associated standard deviations, as well as the t-test for determining the significance of changes in the mean value. The study was conducted with a sample of 20 participants from educational interventions involving students undergoing education, using a pretest and posttest design. Quantitative data were analyzed using the t-test and z-test to determine statistical significance in consumption change at a 95% confidence level ($\alpha = 0.05$). Dependent variables include the average daily intake of fruits and vegetables measured through the 24-hour recall system, which needs to be done; the independent variable is educational interventions. The results of this analysis are shown in Tables 5 and 6 below.

Table 5. The Effect of Nutrition Education on Consuming Vegetables and Fruits

Treatment	n	rerata±sb		t-test	p
		Vegetables	Fruit		
Pretest	20	80.00 ± 12.00	70.00 ± 10.00	10,8	0.004
Posttest	20	110.00 ± 15.00	100.00 ± 12.00		

Based on Table 5 in the Experimental Group, the analysis results show a significant increase in the consumption of vegetables and fruits following nutrition education. The average consumption of vegetables increased from 80.00 to 110.00, and the consumption of fruits increased from 70.00 to 100.00. The t-test yielded a value of $t = 10.8$ with $p = 0.004$ ($p < 0.05$), which suggests that the increase was statistically significant. Thus, nutrition education has a positive effect on increasing the consumption of vegetables and fruits in the Experimental Group.

Table 6. The Effect of Nutrition Education on Consuming Vegetables and Fruits

Control	n	median (min-max)		z-test	p
		Vegetables	Fruit		
Pretest	20	8(11-12)	8(10-11)	0,58	0.564
Posttest	20	8(12,5-15)	9(11-12)		

Based on Table 6 of the control group, it was seen that the median consumption of vegetables and fruits increased after the nutrition education intervention, namely from 8 to 8 for vegetables and

from 8 to 9 for fruits. However, the results of the statistical test, with a *p-value* of 0.564, show that the difference in median consumption is not statistically significant. This suggests that, despite the increase in consumption, nutrition education interventions in this group have not led to substantial changes in vegetable and fruit consumption, as indicated by the median data. Other factors, such as individual variations or measurement methods, may influence these results.

The following graph illustrates the effect of using Android applications in nutrition education on the consumption of vegetables and fruits among adolescents. Data were displayed in the form of consumption scores before (pretest) and after (posttest) interventions, both in the experimental group and in the control group. This graph aims to show the effectiveness of technology-based interventions in improving healthy food consumption patterns.

The Impact of an Android Application in Nutrition Education on Vegetable and Fruit Consumption Among Teenagers

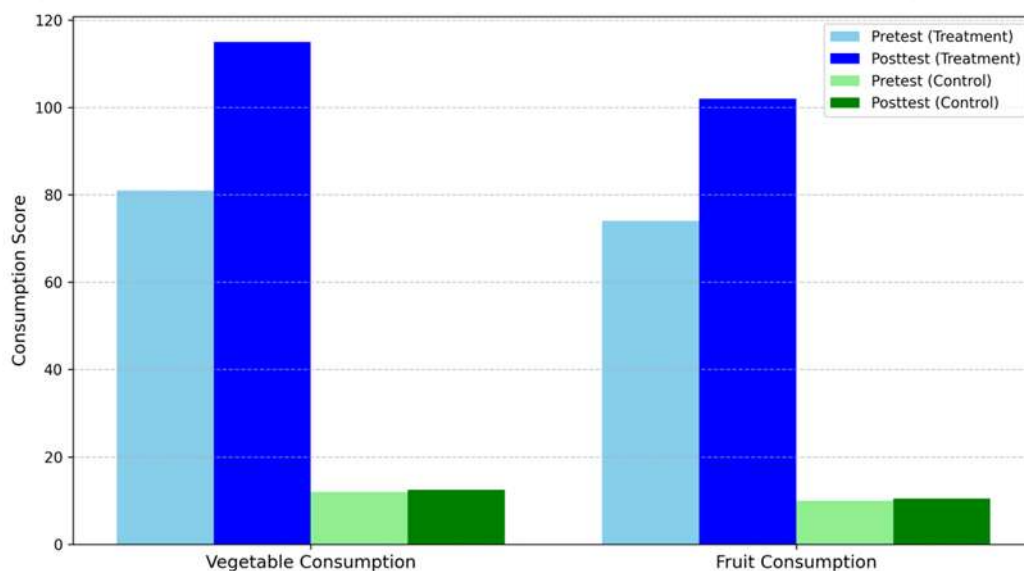


Figure 1. Graph: The influence of Android applications in nutrition education on consuming vegetables and fruits among adolescents

Based on the graph above, which shows the effect of using Android applications in nutrition education on the increase in vegetable and fruit consumption among adolescents. The Experimental Group experienced a significant increase in the consumption of vegetables and fruits from the pretest to the posttest, while the Control Group showed minimal, almost stagnant changes. This indicates that Android apps have a positive impact on adolescents' knowledge and behavior regarding healthy nutrition consumption.

DISCUSSION

Nutrition education plays a crucial role in enhancing the knowledge and behavior of adolescents regarding the consumption of vegetables and fruits. The knowledge gained through nutrition education can influence their healthy food choices and daily eating habits. Android

applications as a medium of nutrition education show significant potential in increasing adolescents' understanding of the importance of consuming vegetables and fruits.

The study consisted of 2 Experimental and control Groups. For the Experimental Group, using the Food Diary: Diet and Health Log application, the average knowledge score increased from 81.00 to 115.00 after the intervention. This increase is in line with the findings reported by the (Wijayanti et al., 2021), which shows that the use of educational media, such as games, can increase knowledge scores and promote the consumption of vegetables and fruits in adolescents (Perdana et al., 2017). The study also supports the results of (Arista et al., 2021) where the use of posters and videos is effective in increasing knowledge and attitudes about consuming vegetables and fruits.

The control group, which only received education through conventional media, experienced an increase in scores from 12.00 to 12.50. Despite the improvement, this was not statistically significant ($p = 0.564$), indicating that nutrition education methods relying solely on conventional presentations are not sufficiently effective in improving knowledge and behavior. This is in line with the findings (Haryana et al., 2023) who found that more interactive and innovative approaches are needed to facilitate changes in consumption attitudes and behaviors among adolescents.

The use of Android apps in nutrition education also enables a more dynamic and engaging delivery of information, which can increase adolescents' motivation to participate in nutrition programs. This is per research by (Oktaviani et al., 2024), which emphasizes the benefits of using technology to increase nutritional awareness, thereby encouraging adolescents to adopt better, healthier behaviors.

Although the study showed a significant increase in knowledge among the Experimental Group, challenges remained in changing the behavior of consuming vegetables and fruits (Devriany et al., 2024) shows that despite the increase in knowledge, motivational factors and a supportive environment are also very important in forming healthier consumption habits, in addition to (Natsir Djide & Pebriani, 2023) underscores the relationship between nutritional knowledge, preferences, and consumption, where behavioral change depends not only on knowledge, but also on social support and accessibility of healthy food.

Overall, Android applications as a medium for nutrition education have proven effective in increasing adolescents' knowledge of the importance of consuming vegetables and fruits. However, changes in consumption behavior also require support from the surrounding environment and a consistent diet. This suggests that a combination of education, accessibility, and social motivation is necessary to achieve long-term success in adopting a healthy habit of consuming vegetables and fruits.

The Influence of Nutrition Education on Knowledge of Vegetables and Fruits

Knowledge is the result of the learning process that occurs through the sensing of particular objects. Based on the data shown in the previous table, the average knowledge score of the control

group before the intervention was 12.00 and increased to 12.50 after the intervention. In the Experimental Group, the average pre-intervention knowledge score was recorded at 81.00 and increased significantly to 115.00 after counseling using the Food Diary: Diet and Health Log application, this is consistent with the research conducted by (Wijayanti et al., 2021) who showed an increase in knowledge and consumption of vegetables and fruits after the intervention using the snake and ladder education game in adolescents in South Jakarta.

The results of the Wilcoxon test showed that there was a significant positive effect of nutrition education using the Food Diary: Diet and Health Log application on knowledge about vegetables and fruits ($p < 0.001$). This research supports the study by (Nuraeni et al., 2021) which also confirmed that the application of creative methods, such as comics, can improve children's knowledge about nutrition. Although there was an increase in knowledge in both groups, the most significant effect was observed in the Experimental Group, Which Used Android-based applications. Limitations in control groups that rely on conventional presentations may lead to low effectiveness in improving knowledge.

The Effect of Nutrition Education on Consuming Vegetables and Fruits

The practice or action studied in this study is the consumption of vegetables and fruits. The average vegetable consumption in the control group before the intervention was 183.01 grams per day and only slightly increased to 178.26 grams per day after the intervention. On the other hand, the Experimental Group showed more positive results, with an increase in vegetable consumption from 108.93 grams to 123.12 grams. Research conducted by (Ayu Budiwati et al., 2020) shows that the socialization program of the Healthy Living Community Movement (GERMAS) has a positive impact on the behavior of consuming vegetables and fruits.

Research by (Aprianty et al., 2024) Those who explored the use of media to increase consumption also confirmed the importance of creatively designed interventions for the adolescent group. Although there was an increase in vegetable and fruit consumption in the Experimental Group, the challenge of achieving the recommended intake remained. The mean increase in the Experimental Group showed no significant difference when compared to the control group ($p = 0.811$ for vegetables and $p = 0.324$ for fruits). This suggests that success in changing the pattern of eating vegetables and fruits is still limited.

External factors, such as the knowledge and availability of vegetables and fruits at home, family habits, and parental support, are necessary to amplify the impact. The availability of vegetables and fruits, as well as parental support, plays a crucial role in shaping children's consumption behaviors. Nutrition education through the Food Diary: Diet and Health Log app results in a significant increase in knowledge, although a corresponding increase in vegetable and fruit consumption does not always accompany this. This intervention still has excellent potential to help

adolescents better understand the importance of a healthy diet, provided a good environment and healthy family habits support it.

CONCLUSION

This study demonstrates that Android applications, used as a medium for nutrition education, have been successful in increasing adolescents' knowledge about consuming vegetables and fruits. Based on the analysis, the Experimental Group using the Food Diary: Diet and Health Log application during the practice period obtained an average knowledge score of 81.00 to 115.00, as well as an increase in vegetable consumption from 108.93-grams to 123.12 grams. This shows that technology is indispensable in nutrition education, as information can be delivered interactively and easily accessible.

BIBLIOGRAPHY

- Aprianty, D., R., A. R., Bachtiar, R. A., & Nuraeni, I. (2024). Media Lagu Untuk Meningkatkan Konsumsi Sayur Dan Buah Siswa Sd Di Kabupaten Tasikmalaya. *Edukasi Masyarakat Sehat Sejahtera (Emass) Jurnal Pengabdian Kepada Masyarakat*. <https://doi.org/10.37160/emass.v6i1.334>
- Arista, C. N., Gifari, N., Nuzrina, R., Sitoayu, L., & Purwara, L. (2021). Perilaku Makan, Kebiasaan Sarapan, Pengetahuan Gizi Dan Status Gizi Pada Remaja Sma Di Jakarta. *Jakagi*. <https://doi.org/10.54771/jakagi.v2i1.206>
- Ayu Budiwati, T. R., Yuliana, T., Agustina, A., & Nurdiantami, Y. (2020). Pengaruh Sosialisasi Gerakan Masyarakat Hidup Sehat Terhadap Perilaku Konsumsi Buah Dan Sayur Pada Remaja. *Jurnal Ilmiah Kesehatan Masyarakat Media Komunikasi Komunitas Kesehatan Masyarakat*. <https://doi.org/10.52022/jikm.v12i2.40>
- Azrimaidaliza, A., & Purnakarya, I. (2011). Analisis Pemilihan Makanan Pada Remaja Di Kota Padang, Sumatera Barat. *Kesmas National Public Health Journal*. <https://doi.org/10.21109/kesmas.v6i1.114>
- Devriany, A., Virmando, E., & Febrianty, R. (2024). Pemberdayaan Minat Anak Sekolah Dasar Terhadap Konsumsi Buah Dan Sayur Dengan Program Singing Technic, Reward Dan Repeated Di Kota Pangkalpinang. *Jurnal Pengabdian Dan Pengembangan Masyarakat Indonesia*. <https://doi.org/10.56303/jppmi.v3i2.68>
- Haryana, N. R., Rosmiati, R., Purba, E. M., & Firmansyah, H. (2023). Gaya Hidup Generasi Z Dalam Konteks Perilaku Makan, Tingkat Stres, Kualitas Tidur Dan Kaitannya Dengan Status Gizi: Literature Review. *Jurnal Gizi Kerja Dan Produktivitas*. <https://doi.org/10.52742/jgkp.v4i2.195>
- Latersia, Y., Alfinnia, S. A., & Muniroh, L. (2022). Hubungan Antara Perilaku Makan Dan Healthy Eating Index Dengan Status Gizi Anak Usia Sekolah Di SDI Darush Sholihin Kabupaten Nganjuk. *Media Gizi Kesmas*. <https://doi.org/10.20473/mgk.v11i2.2022.581-588>
- Lestari, A. T. (2017). Hubungan Tingkat Stres Dan Eating Disorder Dengan Status Gizi Pada Remaja Perempuan Di SMA Negeri 1 Ciwidey. *Jurnal Ilmu Kesehatan Immanuel*. <https://doi.org/10.36051/jiki.v11i2.37>
- Natsir Djide, N. A., & Pebriani, R. (2023). Pengetahuan Gizi Dan Kebiasaan Makan Pada Mahasiswa. *Media Kesehatan Politeknik Kesehatan Makassar*. <https://doi.org/10.32382/medkes.v18i1.445>

- Nuraeni, I., Aprianty, D., Setiawati, D., & Herlani, R. (2021). Anjuran Konsumsi Sayur Buah Menggunakan Komik “Gidza Jadi Suka Sayur Dan Buah.” *Jurnal Abmas Negeri*. <https://doi.org/10.36590/jagri.v2i1.139>
- Oktaviani, R. I., Dina, R. A., Fajriah, E., & Zahra, A. (2024). Pola Konsumsi Sayur Dan Buah Dan Status Gizi Remaja Di Desa Babakan. *Jurnal Sains Dan Teknologi Kesehatan*. <https://doi.org/10.52234/jstk.v4i2.295>
- Perdana, F., Madanijah, S., & Ekayanti, I. (2017). Pengembangan Media Edukasi Gizi Berbasis Android Dan Website Serta Pengaruhnya Terhadap Perilaku Tentang Gizi Seimbang Siswa Sekolah Dasar. *Jurnal Gizi Dan Pangan*. <https://doi.org/10.25182/jgp.2017.12.3.169-178>
- Riset Kesehatan Dasar (Riskesdas). (2018). Laporan Riskesdas 2018 Nasional.pdf. In *Lembaga Penerbit Balitbangkes* (p. hal 156).
- Sugiyono. (2017). *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D*. Alfabeta.
- Utami, A. D., & Kurniasih, M. D. (2022). Persepsi Dan Sikap Calon Guru Biologi Terhadap Potensi Instagram Sebagai Sarana Edutainment Dalam Pembelajaran Biologi. *Biodik*, 8(1), 120–129. <https://doi.org/10.22437/bio.v8i1.15854>
- Wijayanti, T., Fayasari, A., & Khasanah, T. A. (2021). Permainan Edukasi Ular Tangga Meningkatkan Pengetahuan Dan Konsumsi Sayur Buah Pada Remaja Di Jakarta Selatan. *Journal of Nutrition College*. <https://doi.org/10.14710/jnc.v10i1.29153>