



Moving toward a Healthy Eating Pattern: Exploring the Interrelationship of Knowledge, Attitudes, and Behavior in Young Adults

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Article Info

Article history:

Received Jan 2, 2024

Revised Feb 25, 2024

Accepted Mar 31, 2024

Online First Apr 1, 2024

Keywords:

Attitude

Behavior

Dietary Habit

Knowledge

ABSTRACT

Purpose of the study: The main aim of this research is to evaluate the relationship between knowledge, attitudes and dietary behavior in young adults in the area around the Pondok Tinggi health center..

Methodology: Correlational type quantitative methods were used in this research. The sampling technique in this research used simple random sampling. The collecting technique in this research used a questionnaire on knowledge, attitudes and dietary behavior. Data analysis in this research uses correlation hypothesis testing with prerequisite tests for normality and linearity.

Main Findings: The results of the analysis show that there is a significant relationship between people's knowledge and attitudes and dietary behavior. These findings indicate that better knowledge about healthy eating patterns and positive attitudes towards healthy eating patterns significantly contribute to the adoption of better eating behavior in young adults. Thus, this research provides evidence that education and increasing awareness about the importance of healthy eating patterns can be an effective strategy in improving public health.

Novelty/Originality of this study: This research offers a holistic approach in evaluating the relationship between knowledge, attitudes and dietary behavior in adults aged 20-44 years around the Pondok Tinggi Community Health Center, Sungai Banyak City, Jambi province, highlighting the importance of these factors in community health promotion.

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1. INTRODUCTION

Health education is a fundamental aspect in efforts to improve the quality of life for individuals and society at large. Recognized globally, the importance of health education has become a major focus in disease prevention and health promotion efforts [1]-[3]. Health education not only provides knowledge about the factors that influence health, but also builds awareness of the importance of a proactive attitude towards personal and community health [4]-[6]. Health education is a crucial aspect in improving the quality of life for individuals and communities globally, with special attention in the Southeast Asia region where unique health challenges such as changes in unhealthy eating patterns are a priority [7]-[9]. Understanding the relationship between knowledge, attitudes, and dietary behavior in young adults is not only important for increasing understanding of health, but also for designing more effective health education interventions, with broad implications for both individuals and communities regionally and globally.

In Indonesia, the importance of health education cannot be doubted. This country with a large population and cultural diversity faces various health challenges, including the problem of an unbalanced diet and the increasing prevalence of non-communicable diseases [10], [11]. Through integrated health education in the formal and informal education system, Indonesian people can be given a better understanding of the importance of a healthy lifestyle and a balanced diet [12], [13]. Thus, it is hoped that this increased knowledge and awareness can encourage positive behavioral changes, as well as reduce the burden of preventable diseases in the future.

The importance of a healthy lifestyle involves three main aspects, namely knowledge, attitudes and behavior related to eating patterns. Proper knowledge of the nutritional value of food and its impact on health provides a strong foundation for healthy decision making [14]-[16]. However, knowledge alone is not enough without a supportive attitude, such as awareness of the importance of maintaining balance in the food consumed daily [17]-[19]. Apart from that, a positive attitude also influences eating behavior, such as the habit of choosing healthy foods and avoiding unhealthy foods [20]-[22]. Therefore, understanding the relationship between these three aspects is key in efforts to encourage behavioral change towards a healthier lifestyle for people in Indonesia and throughout the world.

Previous research found that overall, women showed good general knowledge about nutrition and the increasing and varied dietary requirements during pregnancy, but little technical knowledge about nutrition and nutrient sources [23]. However, previous research only focused on pregnant women. Based on previous research, various social, economic and environmental factors in local communities influence the dietary practices of pregnant women in rural DRC (Democratic Republic of Congo). As a generalization of previous research, this research was conducted.

Based on previous research, it is known that psychological factors, such as living alone and stress, are related to eating patterns [24]. In other words, a person's attitude in maintaining a diet has an impact on a good diet. The difference is that in previous research the research focused on students. So this research is a form of continuation of previous research. This research was conducted on young adult subjects aged 20-44 years. This research will analyze the relationship between knowledge and attitudes towards dietary behavior.

Previous relevant research highlights increasing public awareness of healthy eating and lifestyle patterns. Previous research found that dietary guidelines provide evidence-based statements regarding food choices to meet nutritional needs and reduce the risk of existing chronic diseases. Previous relevant research highlights increasing public awareness of healthy eating patterns and lifestyles. Previous research has found that dietary guidelines provide evidence-based statements regarding food choices to meet nutritional needs and reduce the risk of existing chronic diseases [25]. As a continuation of previous research, this research is to strengthen previous research that knowledge and attitudes towards dietary behavior can maintain body health. The importance of a balanced and regular diet will prevent a person from deadly diseases.

A comprehensive approach in evaluating the relationship between knowledge, attitudes and dietary behavior in young adults, with a focus on the Indonesian context. While many studies have investigated factors influencing eating patterns, this study stands out for its comprehensive approach and uniqueness in exploring the interactions between knowledge, attitudes, and eating behavior in the diverse cultural and environmental contexts of Indonesia. By considering these three aspects simultaneously, this research has the potential to provide deeper and more applicable insights for the development of more effective health education interventions to encourage healthy eating patterns among young Indonesian adults. This is the novelty of this research.

The impact of this research is very significant in the context of Indonesian public health. By better understanding the relationship between knowledge, attitudes, and dietary behavior in young adults, health stakeholders can design more targeted and effective intervention programs. In addition, the results of this research can be a basis for formulating health policies that are more oriented towards preventing disease through promoting healthy eating patterns. Thus, this research not only provides benefits to individual health, but also has the potential to reduce the burden of non-communicable diseases and improve the quality of life of society as a whole.

The urgency of this research is marked by the escalation of health problems related to unhealthy eating patterns among young Indonesian adults. With the increasing prevalence of non-communicable diseases associated with unbalanced diets, such as obesity, diabetes and heart disease, it is becoming urgent for research to identify factors that influence eating patterns and encourage healthier behavioral changes. The main aim of this research is to evaluate the relationship between knowledge, attitudes and dietary behavior in young adults in the area around the Pondok Tinggi Health Center, Pondok Tinggi Subdistrict, Sungai Banyak City, Jambi Province, with the hope that the results of this research can provide valuable insight for the development of more effective and sustainable health intervention programs. Thus, this research aims to make a real contribution to efforts to prevent disease and promote health in Indonesia, as well as improve the quality of life of society as a whole.

2. RESEARCH METHOD

Correlational type quantitative methods were used in this research to explore and understand the relationship between knowledge, attitudes and dietary behavior variables in young adults in Pondok Tinggi

Village, Sungai Banyak City, Jambi Province. The main characteristic of this method is that it focuses on measuring these variables by using statistical techniques to identify and measure the strength and direction of the relationship between these variables [26]-[28]. This study aims to determine whether there is a correlation between the level of knowledge and attitudes of respondents towards eating patterns and the observed eating behavior. With this approach, research will provide deeper insight into how knowledge and attitudes influence eating behavior, so that the results can be used as a basis for developing more targeted interventions in the promotion of healthy eating patterns in these communities.

The population in this research is the community around the Pondok Tinggi Health Center. The sampling technique uses simple random sampling. The sampling process is carried out randomly and independently, so that each element in the population has an equal chance of being selected as part of the sample [29]-[31]. The research sample consisted of young adults aged between 20-44 years, who were permanent residents or who lived in the Pondok Tinggi sub-district area.

Data collection was carried out through a questionnaire specifically designed to measure the level of knowledge, attitudes and dietary behavior of respondents. The questionnaire is then distributed directly to respondents at the Pondok Tinggi Community Health Center or through an online survey, depending on the situation and respondents' preferences. The grid for this research instrument is presented in table 1 below:

Table 1. Research instrument grid

Variable		
Knowledge	Attitude	Dietary Behavior
Knowledge of the nutritional value of daily food	Attitudes towards healthy eating patterns	Frequency of consumption of nutritious foods (fruit, vegetables, protein sources)
Knowledge of healthy nutritional recommendations	Attitudes towards portion control	The habit of consuming fast food or foods high in fat
Knowledge about the impact of unhealthy eating patterns	Attitudes towards consumption of processed foods	Breakfast, lunch and dinner habits Habit of drinking water

The collected data will be analyzed using correlation statistical techniques to determine the relationship between knowledge and attitudes and dietary behavior. The prerequisite tests that must be carried out before testing the correlation hypothesis are normality and linearity tests [32], [33]. Data must meet the requirements of a normal distribution, namely if the results of the analysis using the Kolmogorov Smirnov normal test obtain a sig value. more than 0.05 [34], [35]. Then the data must be linear, namely if the sig value of Deviation from Linearity is > 0.05. The results of the analysis will be interpreted to gain a deeper understanding of the factors that influence the eating patterns of the younger generation in Pondok Tinggi District, as well as the implications for developing more effective health intervention programs. The flow of this research is explained as follows:

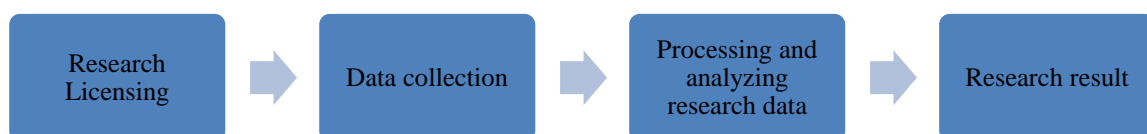


Figure 1. Research Flow

3. RESULTS AND DISCUSSION

Variables in this research include knowledge, attitudes and dietary behavior in the health sector. This research evaluates the relationship between knowledge and attitudes and the dietary behavior of people aged 20-44 years around the Pondok Tinggi Health Center. To find out this, the first data processing is to look for the distribution of the data and the linearity of the data collected. The prerequisite test results for the normality test using Kolmogorv-Smirnov are presented in table 2 below:

Table 2. Normality test results of data on people's knowledge, attitudes and dietary behavior

	One-Sample Kolmogorov-Smirnov Test		
	Knowledge	Attitude	Eating behavior
N	70	70	70
Asymp. Sig. (2-tailed)	.207	.220	.200

Based on the results of data analysis using Kolmogorov-Smirnov with the help of SPSS software, it was found that community knowledge data obtained a significance value of 0.207, community attitudes obtained a

significance value of 0.220 and dietary behavior obtained a significance value of 0.200. So, from the results of data analysis, a decision can be made that H₀ is accepted, meaning that the data on knowledge, attitudes and behavior of people's eating patterns is normally distributed. Next, test the linearity prerequisites which are presented in the following table:

Table 3. Results of linearity test data on people's knowledge, attitudes and dietary behavior

Variables	Sig.	Characteristic
Knowledge * dietary behavior	0.141	Linear
Attitude * eating pattern behavior	0.210	Linear

Based on table 3 above, the significance value of deviation from linearity for knowledge and dietary behavior data is 0.141. This result is more than the value of 0.05, meaning that knowledge and dietary behavior data are linearly related. Then the significance value of deviation from linearity for attitude and dietary behavior data is 0.200. This result is more than the value of 0.05, meaning that the data on physical fitness and fighting games are linearly related.

If the requirements for the correlation hypothesis test are met, then a correlation test is carried out between public health knowledge and dietary behavior and public attitudes and dietary behavior. The test results are presented in table 4 below:

Table 4. Results of correlation tests of knowledge and attitudes with dietary behavior

Variable	Sig. (2-tailed)	Pearson Correlation
Knowledge * dietary behavior	0.010	0.817
Attitude * eating pattern behavior	0.020	0.810

Based on table 4, it is known that there is a significant relationship between public knowledge and dietary behavior with a sig value. (2-tailed) 0.010 is less than 0.05. The level of relationship closeness is categorized as high seen from the Pearson correlation value of 0.817. Then there is a significant relationship between people's attitudes and dietary behavior with the sig value. (2-tailed) 0.020 is less than 0.05. The level of relationship closeness is categorized as high seen from the Pearson correlation value of 0.810. Related aspects: Knowledge about the nutritional value of daily food, Knowledge about healthy nutritional recommendations, and Knowledge about the impact of unhealthy eating patterns related to Frequency of consumption of nutritious food (fruit, vegetables, sources of protein), Habit of consuming fast food or high-fat foods, Breakfast, lunch and dinner habits, and Drinking water habits. Then Attitudes towards healthy eating patterns, Attitudes towards controlling food portions, and Attitudes towards consuming processed foods are also related to dietary behavior starting from the frequency of consuming nutritious foods, the habit of consuming fast food or high-fat foods, Habits for breakfast, lunch and meals. night, as well as the habit of drinking water.

This research is in accordance with Lawrence Green's theory which states that behavior is influenced by predisposing factors, one of which is attitude [32]-[34]. Then this research is in accordance with Lawrence Green's theory which states that behavior is influenced by predisposing factors, one of which is knowledge [33]-[36]. Knowledge is defined as the result of human sensing through the senses that are possessed, namely ears, eyes, nose, taste and touch [37]-[39]. Providing information will increase a person's knowledge. Knowledge can make someone have awareness so that they will behave in accordance with the knowledge they have [44]. Changes in behavior that are based on knowledge, awareness and positive attitudes are lasting because they are based on their own awareness, not coercion.

The results of previous research found that the results showed that the risk of experiencing a stroke decreased significantly with increasing diet knowledge scores and regular eating habits. Then previous research found that for people living in different areas, knowledge of diet determines whether rural residents suffer from stroke [45]. In line with the results of previous research which shows that there is a relationship or influence between knowledge and people's dietary behavior.

The novelty of this research lies in a holistic and integrated approach in evaluating the relationship between knowledge, attitudes and dietary behavior in people aged 20-44 years around the Pondok Tinggi Community Health Center, Sungai Banyak City, Jambi province. This research not only measures the relationship between these variables, but also examines important statistical prerequisite tests such as data distribution, data linearity, and normality tests. In addition, this research contributes to a deeper understanding of the factors influencing dietary behavior, by showing that people's knowledge and attitudes regarding diet can significantly influence their eating behavior. Thus, this research provides a strong foundation for the development of more targeted interventions in the promotion of healthy eating patterns, taking into account the importance of knowledge and attitudes as factors that can influence people's eating behavior.

The implications of this research are very relevant in the context of developing public health interventions, especially in the promotion of healthy eating patterns. The finding that community knowledge and

attitudes are significantly related to dietary behavior provides a strong basis for related parties, such as the Pondok Tinggi Community Health Center and other health institutions, to design more effective educational programs. Interventions focused on increasing knowledge and forming positive attitudes towards healthy eating patterns can be considered an effective strategy in changing people's behavior towards a healthier lifestyle. Apart from that, these findings can also be used as a basis for developing public policies that support public health promotion.

Generalizations from this study can be made with caution, considering the limited characteristics of the population and study area. The finding that community knowledge and attitudes are significantly related to dietary behavior can be considered as a finding that may apply to community populations that have similar characteristics, especially in the context of age and the environment around the Pondok Tinggi Health Center, Sungai Banyak City, Jambi province. However, keep in mind that these generalizations may have limitations and cannot be directly applied to populations that have different characteristics, including different geographic regions, different age strata, or different cultural contexts. Therefore, it is best to generalize the results of this research carefully and accompanied by a deep understanding of the context and characteristics of the population studied. Further research involving more representative samples and a wider variety of contexts is needed to confirm these findings more generally.

4. CONCLUSION

In this research, it was found that there was a significant relationship between community knowledge and attitudes and dietary behavior in the 20-44 year age group around the Pondok Tinggi Community Health Center, Sungai Banyak City, Jambi province. These findings suggest that efforts to increase knowledge and form positive attitudes towards healthy eating patterns can contribute significantly to the adoption of better eating behaviors in society. The implication of this research is the importance of education and awareness about healthy eating patterns as an effective strategy in improving public health and encouraging disease prevention. For further research, the researcher recommends further research involving a more representative sample and a wider variety of contexts to confirm these findings more generally.

ACKNOWLEDGEMENTS

Researchers would like to thank all parties involved.

REFERENCES

- [1] J. Chakaya *et al.*, "Global Tuberculosis Report 2020 – Reflections on the Global TB burden, treatment and prevention efforts," *Int. J. Infect. Dis.*, vol. 113, pp. S7–S12, 2021, doi: 10.1016/j.ijid.2021.02.107.
- [2] M. A. A. Majumder *et al.*, "Antimicrobial stewardship: Fighting antimicrobial resistance and protecting global public health," *Infect. Drug Resist.*, vol. 13, pp. 4713–4738, 2020, doi: 10.2147/IDR.S290835.
- [3] C. Pettan-Brewer *et al.*, "From the Approach to the Concept: One Health in Latin America-Experiences and Perspectives in Brazil, Chile, and Colombia," *Front. Public Heal.*, vol. 9, no. September, pp. 1–18, 2021, doi: 10.3389/fpubh.2021.687110.
- [4] S. Chemali, A. Mari-Sáez, C. El Bcheraoui, and H. Weishaar, "Health care workers' experiences during the COVID-19 pandemic: a scoping review," *Hum. Resour. Health*, vol. 20, no. 1, pp. 1–17, 2022, doi: 10.1186/s12960-022-00724-1.
- [5] T. van Lankveld, H. Thampy, P. Cantillon, J. Horsburgh, and M. Kluijtmans, "Supporting a teacher identity in health professions education: AMEE Guide No. 132," *Med. Teach.*, vol. 43, no. 2, pp. 124–136, 2021, doi: 10.1080/0142159X.2020.1838463.
- [6] K. I. Alcaraz, T. L. Wiedt, E. C. Daniels, K. R. Yabroff, C. E. Guerra, and R. C. Wender, "Understanding and addressing social determinants to advance cancer health equity in the United States: A blueprint for practice, research, and policy," *CA. Cancer J. Clin.*, vol. 70, no. 1, pp. 31–46, 2020, doi: 10.3322/caac.21586.
- [7] B. R. M. Spagnoletti *et al.*, "What factors shape quality of life for women affected by gynaecological cancer in South, South East and East Asian countries? A critical review," *Reprod. Health*, vol. 19, no. 1, pp. 1–19, 2022, doi: 10.1186/s12978-022-01369-y.
- [8] M. A. Rahaman, A. Kalam, and M. Al-Mamun, "Unplanned urbanization and health risks of Dhaka City in Bangladesh: uncovering the associations between urban environment and public health," *Front. Public Heal.*, vol. 11, no. October, pp. 1–18, 2023, doi: 10.3389/fpubh.2023.1269362.
- [9] R. Kiguba, S. Olsson, and C. Waitt, "Pharmacovigilance in low- and middle-income countries: A review with particular focus on Africa," *Br. J. Clin. Pharmacol.*, vol. 89, no. 2, pp. 491–509, 2023, doi: 10.1111/bcp.15193.
- [10] M. Serafini, M. Haque, R. Ahmad, and F. Akter, "Editorial: Diet and nutrition for non-communicable diseases in low and middle-income countries," *Front. Nutr.*, vol. 10, no. 1179640, 2023, doi: 10.3389/fnut.2023.1179640.
- [11] A. Ganju *et al.*, "Systemic solutions for addressing non-communicable diseases in low-and middle-income countries," *J. Multidiscip. Healthc.*, vol. 13, pp. 693–707, 2020, doi: 10.2147/JMDH.S252300.
- [12] T. Noboru *et al.*, "School-based education to prevent bullying in high schools in Indonesia," *Pediatr. Int.*, vol. 63, no. 4, pp. 459–468, 2021, doi: 10.1111/ped.14475.
- [13] F. Rozi *et al.*, "Indonesian market demand patterns for food commodity sources of carbohydrates in facing the global food crisis," *Heliyon*, vol. 9, no. 6, p. e16809, 2023, doi: 10.1016/j.heliyon.2023.e16809.
- [14] S. K. Clinton, E. L. Giovannucci, and S. D. Hursting, "The World Cancer Research Fund/American Institute for Cancer

- Research Third Expert Report on Diet, Nutrition, Physical Activity, and Cancer: Impact and Future Directions,” *J. Nutr.*, vol. 150, no. 4, pp. 663–671, 2020, doi: 10.1093/jn/nxz268.
- [15] F. Leroy *et al.*, “Animal board invited review: Animal source foods in healthy, sustainable, and ethical diets – An argument against drastic limitation of livestock in the food system,” *Animal*, vol. 16, no. 3, 2022, doi: 10.1016/j.animal.2022.100457.
- [16] E. C. Monterrosa, E. A. Frongillo, A. Drewnowski, S. de Pee, and S. Vandevijvere, “Sociocultural Influences on Food Choices and Implications for Sustainable Healthy Diets,” *Food Nutr. Bull.*, vol. 41, no. 2_suppl, pp. 59S-73S, 2020, doi: 10.1177/0379572120975874.
- [17] G. Reddy and R. M. van Dam, “Food, culture, and identity in multicultural societies: Insights from Singapore,” *Appetite*, vol. 149, no. February, p. 104633, 2020, doi: 10.1016/j.appet.2020.104633.
- [18] P. Varela, G. Arvisenet, A. Gonera, K. S. Myhrer, V. Fifi, and D. Valentin, “Meat replacer? No thanks! The clash between naturalness and processing: An explorative study of the perception of plant-based foods,” *Appetite*, vol. 169, no. November 2021, pp. 1–10, 2022, doi: 10.1016/j.appet.2021.105793.
- [19] M. Adhikari, H. R. Devkota, and T. Cesuroglu, “Barriers to and facilitators of diabetes self-management practices in Rupandehi, Nepal- multiple stakeholders’ perspective,” *BMC Public Health*, vol. 21, no. 1, p. 1269, 2021, doi: 10.1186/s12889-021-11308-4.
- [20] D. Ravikumar, E. Spyrelli, J. Woodside, M. McKinley, and C. Kelly, “Parental perceptions of the food environment and their influence on food decisions among low-income families: a rapid review of qualitative evidence,” *BMC Public Health*, vol. 22, no. 1, pp. 1–16, 2022, doi: 10.1186/s12889-021-12414-z.
- [21] M. Ljubičić *et al.*, “Motivation for health behaviour: A predictor of adherence to balanced and healthy food across different coastal Mediterranean countries,” *J. Funct. Foods*, vol. 91, no. December 2021, 2022, doi: 10.1016/j.jff.2022.105018.
- [22] G. Ares, A. L. Velázquez, L. Vidal, M. R. Curutchet, and P. Varela, “The role of food packaging on children’s diet: Insights for the design of comprehensive regulations to encourage healthier eating habits in childhood and beyond,” *Food Qual. Prefer.*, vol. 95, no. April 2021, 2022, doi: 10.1016/j.foodqual.2021.104366.
- [23] B. K. Maykondo *et al.*, “A qualitative study to explore dietary knowledge, beliefs, and practices among pregnant women in a rural health zone in the Democratic Republic of Congo,” *J. Heal. Popul. Nutr.*, vol. 41, no. 1, pp. 1–11, 2022, doi: 10.1186/s41043-022-00333-7.
- [24] S. H. Alzahrani, A. A. Saeedi, M. K. Baamer, A. F. Shalabi, and A. M. Alzahrani, “Eating habits among medical students at king abdulaziz university, Jeddah, Saudi Arabia,” *Int. J. Gen. Med.*, vol. 13, pp. 77–88, 2020, doi: 10.2147/IJGM.S246296.
- [25] J. Drew, C. Cleghorn, A. Macmillan, and A. Mizdrak, “Healthy and climate-friendly eating patterns in the New Zealand context,” *Environ. Health Perspect.*, vol. 128, no. 1, pp. 1–13, 2020, doi: 10.1289/EHP5996.
- [26] J. Zhao *et al.*, “A review of statistical methods for dietary pattern analysis,” *Nutr. J.*, vol. 20, no. 37, pp. 1–18, 2021, doi: <https://doi.org/10.1186/s12937-021-00692-7>.
- [27] C. Hansen, H. Steinmetz, and J. Block, “How to conduct a meta-analysis in eight steps: a practical guide,” *Manag. Rev. Q.*, vol. 72, no. 1, pp. 1–19, 2022, doi: 10.1007/s11301-021-00247-4.
- [28] F. Ulfat, “Empirical research: Challenges and impulses for Islamic religious education,” *Br. J. Relig. Educ.*, vol. 42, no. 4, pp. 415–423, 2020, doi: 10.1080/01416200.2020.1711513.
- [29] M. Smachew, M. F. Melak, A. Atenafu, and A. K. Belew, “Lifestyle Modification Practice and Associated Factors Among Diagnosed Hypertensive Patients in Selected Hospitals in Central Gondar Zone,” *Nutr. Metab. Insights*, vol. 15, 2022, doi: 10.1177/11786388221088245.
- [30] E. Tadesse, “Antenatal care service utilization of pregnant women attending antenatal care in public hospitals during the COVID-19 pandemic period,” *Int. J. Womens. Health*, vol. 12, pp. 1181–1188, 2020, doi: 10.2147/IJWH.S287534.
- [31] A. W. Azagew, D. G. Kassie, and T. A. Walle, “Prevalence of primary dysmenorrhea, its intensity, impact and associated factors among female students’ at Gondar town preparatory school, Northwest Ethiopia,” *BMC Womens. Health*, vol. 20, no. 1, pp. 1–7, 2020, doi: 10.1186/s12905-019-0873-4.
- [32] A. Ankan, I. M. N. Wortel, and J. Textor, “Testing Graphical Causal Models Using the R Package ‘dagitty,’” *Curr. Protoc.*, vol. 1, no. 2, pp. 1–22, 2021, doi: 10.1002/cpz1.45.
- [33] Zainuddin *et al.*, “The correlation of scientific knowledge-science process skills and scientific creativity in creative responsibility based learning,” *Int. J. Instr.*, vol. 13, no. 3, pp. 307–316, 2020, doi: 10.29333/iji.2020.13321a.
- [34] Kamid, W. Syafmen, N. Fajriah, Y. D. Citra, P. A. Rivani, and R. I. Widodo, “Investigating the Role of Traditional Games in Developing Students’ Process Skills and Interest in Learning mathematics,” *Eurasian J. Educ. Res.*, vol. 2022, no. 97, pp. 216–234, 2022, doi: 10.14689/ejer.2022.97.12.
- [35] K. Kamid, R. Rohati, H. Hobri, E. Triani, S. Rohana, and W. A. Pratama, “Process Skill and Student’s Interest for Mathematics Learning: Playing a Traditional Games,” *Int. J. Instr.*, vol. 15, no. 3, pp. 967–988, 2022, doi: 10.29333/iji.2022.15352a.
- [36] T. Mahmudiono, A. Nindiyasari, C. Segalita, A. Durotun Nasikhah, and L. Su Peng, “Nutrition Education on Food Hygiene and Sanitation to increase Knowledge, Attitude and Practice among Canteen Food Handler in Indonesia,” *Syst. Rev. Pharm.*, vol. 11, no. 11, pp. 1396–1400, 2020.
- [37] Y. Khan, I. Hameed, and U. Akram, “What drives attitude, purchase intention and consumer buying behavior toward organic food? A self-determination theory and theory of planned behavior perspective,” *Br. Food J.*, vol. 125, no. 7, pp. 2572–2587, 2023, doi: 10.1108/BFJ-07-2022-0564.
- [38] O. M. A. Ababneh, “How do green HRM practices affect employees’ green behaviors? The role of employee engagement and personality attributes,” *J. Environ. Plan. Manag.*, vol. 64, no. 7, pp. 1204–1226, 2021, doi: 10.1080/09640568.2020.1814708.
- [39] M. H. Marvi, M. M. Minbashrazgah, A. Zarei, and G. S. Baghini, “Knowledge foundation in green purchase behaviour: Multidimensional scaling method,” *Cogent Bus. Manag.*, vol. 7, no. 1, 2020, doi: 10.1080/23311975.2020.1773676.
- [40] R. Huang *et al.*, “Using the theory of planned behavior model to predict factors influencing breastfeeding behavior among

- preterm mothers at week 6 postpartum: the mediating effect of breastfeeding intention,” *Front. Psychol.*, vol. 14, no. September, 2023, doi: 10.3389/fpsyg.2023.1228769.
- [41] A. Hasselgren, K. Kravlevska, D. Gligoroski, S. A. Pedersen, and A. Faxvaag, “Blockchain in healthcare and health sciences—A scoping review,” *Int. J. Med. Inform.*, vol. 134, no. December 2019, p. 104040, 2020, doi: 10.1016/j.ijmedinf.2019.104040.
- [42] M. A. Komolafe, O. E. Olorunmoteni, and F. O. Fehintola, “Effect of Health Education on Level of Awareness and Knowledge of Nigerian In-School adolescents on Stroke and Its Risk Factors,” *J. Stroke Cerebrovasc. Dis.*, vol. 29, no. 5, pp. 1–7, 2020, doi: 10.1016/j.jstrokecerebrovasdis.2020.104757.
- [43] A. E. J. van Gaalen, J. Brouwer, J. Schönrock-Adema, T. Bouwkamp-Timmer, A. D. C. Jaarsma, and J. R. Georgiadis, “Gamification of health professions education: a systematic review,” *Adv. Heal. Sci. Educ.*, vol. 26, no. 2, pp. 683–711, 2021, doi: 10.1007/s10459-020-10000-3.
- [44] J. C. A. Sandoval-Rivera, “Environmental education and indigenous knowledge: Towards the connection of local wisdom with international agendas in the framework of the Sustainable Development Goals (SDGs),” *Diaspora, Indig. Minor. Educ.*, vol. 14, no. 1, pp. 14–24, 2020, doi: 10.1080/15595692.2019.1652588.
- [45] R. Xiang, X. Zhai, Q. Zhang, and Z. Wang, “Relationship Between Dietary Knowledge, Socioeconomic Status, and Stroke Among Adults Involved in the 2015 China Health and Nutrition Survey,” *Front. Nutr.*, vol. 8, no. September, pp. 1–12, 2021, doi: 10.3389/fnut.2021.728641.