

**PREDISPOSING, ENABLING, AND REINFORCING FACTORS ASSOCIATED
WITH FRUIT AND VEGETABLE CONSUMPTION AMONG STUDENTS IN
THE FACULTY OF HEALTH SCIENCES, MEDICINE, AND NATURAL
SCIENCES AT AIRLANGGA UNIVERSITY**

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ABSTRACT

A preliminary study at the Faculty of Health Sciences, Medicine, and Natural Sciences (FIKKIA), Universitas Airlangga, discovered that 97,5% of the scholars ingested below five portions of produce each day. The present research intended to analyze the associations connecting predisposing factors (sex, migration status, preference, and nutrition knowledge), enabling factors (pocket money and fruit and vegetable availability), as well as reinforcing factors (peer influence) toward fruit and vegetable consumption within the student population of FIKKIA Universitas Airlangga. An observational analytical inquiry utilizing a cross-sectional framework was executed on 141 enrolled undergraduates from the 2023–2025 academic cohorts, chosen via proportional stratified random sampling. Information was gathered utilizing organized surveys and evaluated applying both simple and multiple logistic regression. The multiple logistic regression demonstrated that preference ($p = 0,028$; $OR = 2,306$), fruit and vegetable availability ($p < 0,001$; $OR = 4,396$), along with peer influence ($p = 0,026$; $OR = 2,349$) exhibited meaningful correlations with fruit and vegetable consumption, whereas sex, migration status, nutrition knowledge, and pocket money demonstrated no statistical significance. Such outcomes underscore the necessity of enhancing produce accessibility, cultivating beneficial dietary inclinations, and augmenting companion encouragement to stimulate more wholesome nutritional habits across university attendees.

Keywords: *Fruit and vegetable consumption, preference, fruit and vegetable availability, peer influence, university students.*

INTRODUCTION

Vegetables and fruits are a food group that carries an essential function in fulfilling dietary requirements, given that it supplies dietary fiber, micronutrients, minerals, and diverse bioactive elements which sustain internal physiological operations, avert cellular deterioration, and lower the vulnerability to non-communicable illnesses including cardiovascular ailments, corpulence, type 2 diabetes mellitus, and high blood pressure (Aune et al., 2017). WHO advises a baseline everyday ingestion of 400 grams, or the parity of five portions, regarding greens and fruits representing a nutritional approach directed toward diminishing the hazard of non-communicable afflictions. However, adherence to this recommendation remains low, including in Indonesia (WHO, 2023).

Inadequate fruit and vegetable consumption is similarly commonly witnessed within collegiate demographics. A transnational investigation conducted by Peltzer and Pengpid (2015) documented that 82,8% of tertiary learners spanning 26 nations ingested below five portions of produce each day (Peltzer & Pengpid, 2015), while research on students in Kenya indicated that approximately 80% fell below WHO recommendations (Nyanchoka et al., 2022). In Indonesia, results from the 2023 Indonesian Health Survey (SKI) revealed that 96,7% of the population aged five and older failed to meet fruit and vegetable consumption guidelines; 67,5% ingested exclusively one to two portions daily, whereas a mere 3,3% attained the advocated five portions (BKPK, 2023). Similar trends are found among health science students in Indonesia; for instance, 60,4% of Public Health students at Universitas Negeri Gorontalo exhibited poor fruit and vegetable consumption habits (Nurfadillah & Kimun, 2024), and 74,1% of health science students at Universitas Muhammadiyah Kalimantan Timur fell below recommended intake levels (Safitriani & Masnina, 2022). An initial assessment executed by the investigators comprising 40 undergraduates originating from FIKKIA Universitas Airlangga additionally demonstrated that 97,5% ingested below five portions of produce each day, implying that inadequate fruit and vegetable consumption is a persistent issue even among health science students.

Low vegetable and fruit intake among young adults warrants attention, as deficiencies in micronutrients, fiber, and antioxidants can impair immune function and affect the cognitive performance and daily energy levels required for students' academic activities (Aune et al., 2017). Nutritional practices developed throughout early maturity frequently continue into later stages of life, potentially elevating the vulnerability to adiposity, cardiovascular ailments, and metabolic dysfunctions in forthcoming years (Ushula et al., 2023). University students face unique challenges in maintaining a balanced diet due to their greater autonomy in making food choices particularly those living away from their families (Palamutoglu et al., 2024).

Inadequate fruit and vegetable consumption is a complex issue that can be explained through the PRECEDE theoretical framework developed by Green (1980), which categorizes health behavior determinants into predisposing, enabling, and reinforcing factors. These three categories provide practical direction for designing intervention strategies: predisposing factors point to the need for strengthening students' knowledge and preferences, enabling factors highlight the importance of enhancing accessibility regarding produce, and reinforcing factors emphasize the role of peer support in sustaining healthy eating behavior. In the present study, these three categories are represented respectively by preference and nutritional knowledge (predisposing), fruit and vegetable availability (enabling), and peer influence (reinforcing). Predisposing factors such as gender, status as a student living away from home, preferences, and nutritional knowledge represent internal individual characteristics. Previous studies have yielded mixed results regarding gender; Ramadhan et al. (2025) discovered that female scholars exhibited a marginally higher consumption frequency (Ramadhan et al., 2025), whereas Irwan et al. (2024) found no significant association, while Fermeza and Isaura

(2022) identified a significant link during the COVID-19 pandemic (Fermeza & Isaura, 2022). Living away from home is also associated with consumption patterns; as an illustration, a scholarly inquiry by El Ansari et al. (2012) on European students found that those living apart from their parents consumed fruits and vegetables less frequently (El Ansari et al., 2012). Preference alongside nutrition knowledge additionally execute a vital function; learners possessing advantageous preference held a 5,85 greater probability of ingesting produce in accordance with recommendations (Irwan et al., 2024).

Enabling factors, encompassing pocket money and the availability of vegetables and fruits, correlate with intake behavior. Nurfadillah and Kimun (2024) discovered a meaningful connection linking the volume of pocket money to the recurrence of produce ingestion among university students living in boarding accommodation (Nurfadillah & Kimun, 2024), while Safitriani and Masnina (2022) demonstrated a significant link between availability and consumption, noting that individuals with good availability were far more likely to consume these foods regularly (Safitriani & Masnina, 2022). Reinforcing factors specifically peer influence were also reported possess a substantial correlation with the learners' healthy eating habits (Nurfadillah & Kimun, 2024), aligning with the view that peer environments can either reinforce or hinder healthy eating behaviors via mechanisms including modeling alongside social support.

Previous studies have generally examined only specific factors in isolation, with few integrating predisposing, enabling, and reinforcing factors simultaneously within a single research framework particularly among student populations with diverse academic backgrounds, such as those at FIKKIA Universitas Airlangga. By examining these three groups of determinants simultaneously within a single model, this research provides a more extensive comprehension of their relative contributions and provides a stronger basis for formulating multi-level intervention strategies compared with studies that examine such factors separately. Such an integrated framework is expected to generate more actionable, evidence-based recommendations for university health promotion programs than findings derived from single-factor studies. Consequently, the present research intends to analyze the relationships between gender, migrant status, preferences, nutritional knowledge, allowance, the availability of vegetables and fruits, and peer influence regarding vegetable and fruit consumption among FIKKIA Universitas Airlangga students, thereby providing a basis for formulating more targeted strategies to elevate vegetable and fruit consumption consumption.

RESEARCH METHOD

Research Design

An analytical observational study using a quantitative approach was executed to examine the correlation connecting predisposing, enabling, and reinforcing factors and vegetable and fruit consumption among university students. The research applied a cross-sectional framework, where all variables were assessed within the same period without any intervention from the researchers.

Population and Sample

The research population comprised all enrolled scholars originating from the Faculty of Health, Medicine, and Natural Sciences (FIKKIA) at Universitas Airlangga across the 2023, 2024, and 2025 cohorts, totaling 780 students. The sample size was calculated using the formula by Lemeshow et al. (1997), resulting in a minimum sample of 141 respondents selected via proportional stratified random sampling based on study programs: Medicine (18 students), Veterinary Medicine (52 students), Public Health (43 students), and Aquaculture (28 students). Inclusion criteria comprised active students from the 2023, 2024, and 2025 cohorts who consented to participate via executing an informed consent document, whereas the exclusion criteria encompassed learners presently on academic leave or those unwilling to participate.

Data Collection Instruments and Techniques

Information was gathered between May and June 2026 via organized interviews applying a survey instrument comprising several sections: respondent characteristics, preferences, nutritional knowledge, pocket money, availability of vegetables and fruits, peer influence, and vegetable and fruit consumption. The preference instrument consisted of 10 statements using a 4 point Likert scale, adapted from previous research (Savitri, 2019). The nutrition knowledge instrument consists of 19 true-false statements adapted from previous research (Tazhkia, 2023). The instrument measuring fruit and vegetable availability encompasses six questions utilizing a 5 point Likert scale, whereas the assessment tool evaluating peer influence contains 12 questions, similarly utilizing a 5 point Likert scale. These two assessment tools were formulated by the investigators grounded upon indicators of enabling and reinforcing factors from the theory proposed by Green (1980) and a review of prior research on food consumption behavior. Fruit and vegetable consumption was quantified utilizing the dietary behavior module from the WHO STEPS framework (WHO, 2024). All instruments underwent validity and reliability testing on 40 respondents (significance level of 5%; $r\text{-table} = 0,312$) preceding their utilization within the investigation. Every question was determined to be valid, possessing corrected item-total correlation ($r\text{-count}$) scores surpassing the $r\text{-table}$. Reliability evaluation applying Cronbach's Alpha generated scores of 0,721 regarding the preference assessment tool, 0,827 for the nutritional knowledge instrument, 0,896 for the fruit and vegetable availability instrument, 0,946 for the peer influence instrument, and 0,652 concerning the fruit and vegetable consumption assessment tool, demonstrating that all instruments were reliable (Cronbach's Alpha > 0,6).

Research variables were categorized based on their respective cut-off values. The preference variable was categorized based on a median score of 30 (dislike < 30; like $\geq$ 30); the nutrition knowledge variable used a median score of 15 (poor < 15; good $\geq$ 15); the fruit and vegetable availability variable used a median score of 22 (poor < 22; good $\geq$ 22); the peer influence variable used a mean score of 30,16 (poor < 30,16; good $\geq$ 30,16); and the fruit and vegetable consumption parameter utilized a median of 1,71 servings per day (relatively lower < 1,71; relatively higher $\geq$ 1,71).

Data Analysis Techniques

The analysis of information was executed systematically, encompassing univariate, bivariate, and multivariate examinations utilizing the R Studio application. The univariate assessment was applied to illustrate the frequency distribution characterizing every parameter. The bivariate evaluation applied simple logistic regression to investigate the correlation connecting every independent variable to the dependent variable, with relationships considered significant at $p \leq 0,05$. Prior to multivariate analysis, a multicollinearity test was performed using Tolerance and Variance Inflation Factor (VIF) scores; parameters possessing a Tolerance $< 0,10$ alongside a VIF > 10 were considered to display multicollinearity. Parameters yielding a $p < 0,25$ during the bivariate examination were considered eligible for initial multivariate modeling. These variables were then evaluated applying multiple logistic regression via the forward selection technique to determine the parameters preserved within the ultimate model. The concluding framework was chosen grounded on the scores of the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Nagelkerke R-square, whereas its goodness-of-fit was evaluated applying the Hosmer-Lemeshow test. The present investigation acquired ethical approval from the Health Research Ethics Committee of the Faculty of Public Health, Universitas Airlangga (certificate number 59/EA/KEPK/2026).

RESULT AND DISCUSSION

Respondent Characteristics

Respondent characteristics based on age, study program, and cohort are displayed within Table 1.

Table 1. Respondent Characteristics (n = 141)

Variable	Categorized	n	%
Age	17 years	1	0,71
	18 years	15	10,64
	19 years	38	26,95
	20 years	28	19,86
	21 years	38	26,95
	22 years	19	13,47
	23 years	2	1,42
Study Program	Medicine	18	12,77
	Veterinary Medicine	52	36,88
	Public Health	43	30,49
	Aquaculture	28	19,86
Cohort	2023	59	41,84
	2024	23	16,32
	2025	59	41,84

Source: Primary data, 2026

The predominant portion of the participants were 19 and 21 years old, with 38 individuals (26,95%) in each age group. By study program, the largest number of

respondents came from the Veterinary Medicine program (36,88%), while by cohort, the majority belonged to the classes of 2023 and 2025 (41,84% each).

Distribution of Predisposing, Enabling, and Reinforcing Factors and Vegetable and Fruit Consumption

Table 2. Distribution of Respondents Based on Predisposing, Enabling, and Reinforcing Factors and Fruit and Vegetable Consumption (n = 141)

Variable	Categorized	n	%
Sex	Male	40	28,37
	Female	101	71,63
Migration Status	Non-migrant	37	26,24
	Migrant	104	73,76
Preference	Dislike	63	44,69
	Like	78	55,31
Nutrition Knowledge	Poor	54	38,30
	Good	87	61,70
Pocket Money	Low (< Rp 500.000)	29	20,57
	Moderate (Rp 500.000 – 1.000.000)	54	38,30
	High (> Rp 1.000.000)	58	41,13
Fruit and Vegetable Availability	Poor	60	42,56
	Good	81	57,44
Peer Influence	Poor	75	53,20
	Good	66	46,80
Fruit and Vegetable Consumption	Relatively Lower	66	46,81
	Relatively Higher	75	53,19

Source: Primary data, 2026

Table 2 demonstrates that the respondents were predominantly female (71,63%) and students living away from home (73,76%). Over fifty percent of the participants preferred vegetables and fruits (55,31%) and possessed good nutritional knowledge (61,70%); however, these figures did not align with the proportion of actual vegetable and fruit consumption, which remained relatively low (46,81%). Regarding enabling factors, the predominant portion of the participants exhibited a moderate-to-high allowance and reported good availability of vegetables and fruits (57,44%), although 42,56% still reported poor availability. In terms of reinforcing factors, over fifty percent of the participants (53,20%) reported unsupportive peer influence regarding encouragement and direct involvement in adopting a healthy diet.

The Relationship of Predisposing, Enabling, and Reinforcing Factors with Vegetable and Fruit Consumption

Table 3. Outcomes of the Bivariate Assessment concerning the Correlation connecting Predisposing, Enabling, and Reinforcing Factors and Vegetable and Fruit Consumption among FIKKIA Universitas Airlangga Students

Fruit and Vegetable Consumption						
Variable	Relatively Lower		Relatively Higher		OR (95% CI)	p-value
	n	%	n	%		
Sex						
Male	23	57,50	17	42,50	1,824 (0,874-3,872)	0,111
Female	43	42,57	58	57,43	Ref	
Migration Status						
Non-migrant	49	47,12	55	52,88	1,048 (0,493-2,241)	0,903
Migrant	17	45,95	20	54,05	Ref	
Preference						
Dislike	38	60,32	25	39,68	2,714 (1,379-5,443)	0,004
Like	28	35,90	50	64,10	Ref	
Nutrition Knowledge						
Poor	29	53,70	25	46,30	1,567 (0,793-3,122)	0,197
Good	37	42,53	50	57,47	Ref	
Pocket Money						
Low	12	41,38	17	58,62	0,868 (0,347-2,133)	0,760
Moderate	28	51,85	26	48,15	1,325 (0,630-2,802)	0,458
High	26	44,83	32	55,17	Ref	
Fruit and Vegetable Availability						
Poor	40	66,67	20	33,33	4,230 (2,104-8,761)	0,001
Good	26	32,10	55	67,90	Ref	
Peer Influence						
Poor	43	57,33	32	42,67	2,512 (1,279-5,027)	0,008
Good	23	34,85	43	65,15	Ref	

Source: Primary data, 2026

Based on Table 3, the bivariate analysis results indicate that preference, the availability of vegetables and fruits, and peer influence exhibit a substantial correlation with vegetable and fruit consumption ($p < 0,05$). Participants expressing a distaste for vegetables and fruits possessed reduced probabilities of ingesting them in comparison to individuals demonstrating an affinity ($OR = 2,714$; $95\% CI: 1,379-5,443$). Vegetable and fruit availability showed the strongest association; respondents with poor availability had 4,230 times the odds of lower vegetable and fruit consumption compared to those with

good availability (OR = 4,230; 95% CI: 2,104–8,761). Additionally, low peer influence correlated with diminished vegetable and fruit consumption (OR = 2,512; 95% CI: 1,279–5,027). Conversely, the parameters encompassing gender, migrant status, nutritional knowledge, alongside pocket money demonstrated no meaningful correlation ($p > 0,05$).

Multivariate Analysis

Prior to multivariate analysis, variables with p -values $< 0,25$ within the bivariate evaluation were deemed appropriate for preliminary multivariate modeling. Multicollinearity test results indicated that all candidate variables (gender, preference, nutritional knowledge, fruit and vegetable availability, and peer influence) had tolerance values $> 0,10$ and VIF values < 10 , indicating no evidence of multicollinearity. Although gender met the initial screening criterion ($p = 0,111$), it was not retained during the forward selection procedure. The procedure yielded four candidate models, as demonstrated within Table 4.

Table 4. Results of Multiple Logistic Regression Multivariate Analysis

			B	OR	95% CI	p-value
Model 1	Fruit and Vegetable Availability	Poor	1,442	4,230	2,104-8,761	0,001
		Good			Ref	
	Constant		-0,749	0,472	0,292-0,745	0,001
Model 2	Fruit and Vegetable Availability	Poor	1,497	4,468	2,170-9,549	0,001
		Good			Ref	
	Peer Influence	Poor	1,000	2,718	1,319-5,768	0,007
		Good			Ref	
	Constant		-1,313	0,268	0,134-0,504	0,001
Model 3	Fruit and Vegetable Availability	Poor	1,480	4,396	2,106-9,537	0,001
		Good			Ref	
	Peer Influence	Poor	0,854	2,349	1,114-5,070	0,026
		Good			Ref	
	Preference	Dislike	0,835	2,306	1,096-4,929	0,028
		Like			Ref	
	Constant		-1,604	0,200	0,092-0,402	0,001
Model 4	Fruit and Vegetable Availability	Poor	1,467	4,339	2,068-9,456	0,001
		Good			Ref	
	Peer Influence	Poor	0,953	2,595	1,207-5,754	0,016
		Good			Ref	
	Preference	Dislike	0,815	2,260	1,068-4,855	0,034
		Like			Ref	
	Nutrition Knowledge	Poor	0,572	1,773	0,823-3,892	0,146
		Good			Ref	
	Constant		-1,873	0,153	0,062-0,339	0,001

Source: Primary data, 2026

Model 3, comprising vegetable and fruit availability, peer influence, and preferences, was chosen as the ultimate framework given that it offered the best balance between simplicity and model fit (Nagelkerke R Square = 0,249; AIC = 173,77; BIC = 185,57). Although Model 4 had a slightly lower AIC, the addition of the nutritional

knowledge variable only increased the Nagelkerke R Square from 0,249 to 0,265 and raised the BIC value; furthermore, it lacked statistical significance ($p = 0,146$), resulting in the choice of Model 3. The outcomes of the framework suitability assessment are displayed within Table 5.

Table 5. Comparison of Model Suitability

Model	Nagelkerke R Square	AIC	BIC
1	0,150	182,05	187,95
2	0,211	176,63	185,48
3	0,249	173,77	185,57
4	0,265	173,64	188,38

Source: Primary data, 2026

Based on Model 3, the resulting logistic regression equation is $\text{Ln}(P/(1-P)) = -1,604 + 1,480$ (low availability of vegetables and fruits) $+ 0,854$ (low peer influence) $+ 0,835$ (dislike preference). The model fit test (Hosmer-Lemeshow) generated a p-value of 0,4425 ($p > 0,05$), signifying an adequate conformity concerning the framework and the observed data. Vegetable and fruit availability showed the strongest association (OR = 4,396; 95% CI: 2,106–9,537; $p = 0,001$). Respondents with low availability of vegetables and fruits were 4,396 times possessed a higher probability of demonstrating comparatively reduced vegetable and fruit consumption compared to those with good availability. Additionally, low peer influence (OR = 2,349; 95% CI: 1,114–5,070; $p = 0,026$) and dislike preference (OR = 2,306; 95% CI: 1,096–4,929; $p = 0,028$) similarly exhibited a meaningful correlation regarding vegetable and fruit consumption. Jointly, these three parameters within Model 3 accounted for 24,9% of the variance regarding the learners' vegetable and fruit consumption, while the remaining 75,1% was attributable to factors outside this research model. Vegetable and fruit availability demonstrated the most robust correlation regarding ingestion, succeeded by peer influence alongside preference.

Discussion

Within the present investigation, gender displayed no meaningful correlation regarding fruit and vegetable consumption, corresponding with the discoveries documented by Irwan et al. (2024) regarding Public Health students at Gorontalo State University. These results differ from the study by Fermeza and Isaura (2022) on Airlangga University students, which identified a significant association. Such variance could be ascribed to the setting characterizing the research by Fermeza and Isaura (2022), which was executed throughout the COVID-19 outbreak a period marked by shifts in activity, mobility, and food access that likely amplified behavioral differences between genders. Under normal conditions, like the ones within the current investigation, male and female students share similar academic and food environments, resulting in comparable exposure to food choices. The finding that demographic factors do not always directly determine health behaviors is also consistent with Yufa and Prayoga (2024); their

work demonstrates that the formation of demand for health behaviors or services is a multidimensional process affected not exclusively through personal attributes but additionally via accessibility, values, norms, technology, and environmental factors (Yufa & Prayoga, 2024).

Living away from home similarly lacked a substantial correlation regarding fruit and vegetable consumption, a finding consistent with research by Citrowske (2020) and Al Jauziyah et al. (2021), which indicates that living arrangements are not the primary determinant of university students' dietary patterns (Al Jauziyah et al., 2021; Citrowske, 2020). This result differs from the research conducted by El Ansari et al. (2012) across Europe, which identified a meaningful correlation; this divergence is presumably attributable to distinctions within the academic nutritional setting, as FIKKIA students whether living away from home or not are exposed to a campus food environment that is relatively uniform in terms of availability and accessibility (Li et al., 2022).

Preference was significantly correlated with fruit and vegetable consumption within the current research, aligning with Irwan et al. (2024), who documented that students with favorable preferences tended to consume fruits and vegetables more frequently. Some respondents within the present investigation might have discovered the sensory characteristics of fruits and vegetables, including taste, aroma, and appearance, less appealing. These findings suggest that food presentation and preparation methods that consider student preferences could be incorporated into university nutrition promotion initiatives (Irwan et al., 2024).

Nutritional knowledge is not significantly correlated with fruit and vegetable consumption, even though the majority of respondents possess good nutritional knowledge. These findings illustrate a knowledge-behavior gap a phenomenon also reported in a systematic evaluation executed by Spronk et al. (2014), which deduced that nutritional knowledge independently is not consistently adequate to change dietary behavior without the support of conducive environmental and social factors (Spronk et al., 2014).

Within the current research, pocket money demonstrated no meaningful association with vegetable and fruit consumption, contrasting with the findings of Nurfadillah and Kimun (2024) regarding university students living in rented accommodation in Gorontalo. This discrepancy may be attributed to the relatively affordable cost of vegetables and fruits in the study area across all pocket-money brackets, meaning that purchasing power was not a primary constraint compared to factors such as availability and preference (Nurfadillah & Kimun, 2024).

Within this investigation, fruit and vegetable availability demonstrated the most robust correlation regarding fruit and vegetable consumption. This outcome aligns with Safitriani and Masnina (2022), who documented a substantial correlation connecting fruit and vegetable availability and consumption among health science students. In the present study, limited availability was particularly reported for fruit in campus canteens and nearby food stalls. This outcome similarly corresponds with a systematic evaluation formulated by Li et al. (2022), which recognized the collegiate nutritional setting,

encompassing the availability alongside the economic feasibility of wholesome nutritional alternatives, representing a pertinent element correlated with the learners' dietary practices (Li et al., 2022).

Peer influence exhibited a substantial correlation regarding fruit and vegetable consumption, consistent with Nurfadillah and Kimun (2024), who reported an association between peer support and healthy eating habits among university students. Peer environments may be relevant to eating behavior through modeling, group norms, encouragement, and social support (Higgs & Thomas, 2016). In the present study, peer involvement in encouraging wholesome dietary habits alongside fruit and vegetable consumption seemed constrained. This outcome underscores the necessity of considering the social context in which university students make dietary choices.

The originality of this research is rooted in the concurrent investigation regarding predisposing, enabling, alongside reinforcing factors correlated with fruit and vegetable consumption within a single analytical model among FIKKIA students. Nurfadillah and Kimun (2024) examined pocket money and peer support among students living in boarding houses and reported significant associations of both factors with consumption habits. Conversely, the current investigation discovered that peer influence exhibited a substantial correlation regarding fruit and vegetable consumption, while pocket money lacked this connection. Alternative inquiries have concentrated upon particular dimensions concerning nutritional conduct, including preference among health and non-health students in Yogyakarta (Wahyuni et al., 2024) and sociodemographic characteristics, dietary preference, alongside obstacles impeding fruit and vegetable ingestion among university students in Thailand (Kaewpradup et al., 2024). By integrating individual characteristics and preferences, enabling resources and food availability, and peer influence within one multivariate model, the current research broadens those methodologies through analyzing the relationships of factors across all three domains within the same student population.

The outcomes possess actionable consequences concerning campus-centered dietary advocacy. Academic institutions might contemplate enhancing the availability, reachability, alongside the economic feasibility regarding produce in campus canteens and nearby food outlets, including through collaboration with food vendors to provide a wider variety of appealing options. Nutrition promotion initiatives could also take student preferences into account through more attractive food presentation and preparation methods. In addition, peer-led activities, such as student nutrition ambassadors, shared healthy-eating initiatives, and social media campaigns, could be considered to encourage supportive social norms around fruit and vegetable consumption. These recommendations are consistent with evidence on food availability, price, sensory characteristics, and food environment interventions in postsecondary education settings (Barrett et al., 2023; Fischera et al., 2022; Li et al., 2022). Although this cross sectional investigation was executed inside an exclusive academic department and cannot establish causal relationships, its findings may inform context-specific nutrition promotion initiatives. Similar strategies could be considered by other universities, with implementation adapted

to local food environments and student needs. Future studies using intervention designs could evaluate whether changes in food availability and peer support are accompanied by enhancements concerning the factual ingestion of fruits and vegetables.

CONCLUSION

This study concludes that preference, fruit and vegetable availability, and peer influence were significantly associated with fruit and vegetable consumption across FIKKIA Universitas Airlangga students, whereas sex, migration status, nutritional knowledge, and pocket money were not significantly associated. The multiple logistic regression evaluation demonstrated that availability possessed the most robust correlation regarding comparatively diminished fruit and vegetable consumption (OR = 4,396), succeeded by peer influence (OR = 2,349) alongside preference (OR = 2,306). The statistical framework accounted for 24,9% of the variance concerning consumption, signifying that supplementary elements unassessed within the present research might additionally influence the learners' dietary tendencies. These outcomes underscore the necessity of considering individual preferences, food availability, and social influences when devising strategies to encourage fruit and vegetable consumption across collegiate learners.

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REFERENCES

- Al Jauziyah, S. S., Nuryanto, Tsani, A. F. A., & Purwanti, R. (2021). Pengetahuan Gizi dan Cara Mendapatkan Makanan Berhubungan dengan Kebiasaan Makan Mahasiswa Universitas Diponegoro. *Journal of Nutrition College*, 10, 72–81. <https://doi.org/10.14710/jnc.v10i1.30428>
- Aune, D., Giovannucci, E., Boffetta, P., Fadnes, L. T., Keum, N. N., Norat, T., Greenwood, D. C., Riboli, E., Vatten, L. J., & Tonstad, S. (2017). Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality-A systematic review and dose-response meta-analysis of prospective studies. *International Journal of Epidemiology*, 46(3), 1029–1056. <https://doi.org/10.1093/ije/dyw319>
- Barrett, E. M., Hart, A. C., Bhat, S., Marklund, M., Coyle, D. H., Heenan, M., Pettigrew, S., & Wu, J. H. (2023). The Effect of Retail Food Environment Interventions on Dietary Behavior in Postsecondary Education Settings: A Systematic Review and Meta-analysis. *The Journal of nutrition*, 153(10), 3122–3130. <https://doi.org/10.1016/j.tjnut.2023.08.034>
- BKPK. (2023). *Survei Kesehatan Indonesia (SKI) dalam Angka*. <https://www.badankebijakan.kemkes.go.id/ski-2023-dalam-angka/>

- Citrowske, A. (2020). *Predictors of Fruit and Vegetable Intake Among University Students*. <https://commons.und.edu/theses>
- El Ansari, W., Stock, C., & Mikolajczyk, R. T. (2012). Relationships between food consumption and living arrangements among university students in four European countries - A cross-sectional study. *Nutrition Journal*, *11*, 1-7. <https://doi.org/10.1186/1475-2891-11-28>
- Fermeza, R. D. P., & Isaura, E. R. (2022). Hubungan Literasi Kesehatan terkait Gizi dan Pola Konsumsi Sayur dan Buah pada Mahasiswa Selama Masa Pandemi COVID-19. *Media Gizi Kesmas*, *11*(2), 488–493. <https://doi.org/10.20473/mgk.v11i2.2022.488-493>
- Fischera, W., van Beusekom, M., Higgs, S., & Cecil, J. E. (2022). A Social Norms and Identity Approach to Increasing Fruit and Vegetable Intake of Undergraduate Students in the United Kingdom. *Frontiers in psychology*, *13*, 1-13. <https://doi.org/10.3389/fpsyg.2022.838394>
- Green, L. W., Kreuter, M. W., Deeds, S. G., & Partridge, K. B. (1980). *Health education planning: A diagnostic approach*. Mayfield Publishing.
- Higgs, S., & Thomas, J. (2016). Social influences on eating. *Current Opinion in Behavioral Sciences*, *9*, 1-6. <https://doi.org/10.1016/j.cobeha.2015.10.005>
- Irwan, Kadir, S., & Ain, N. (2024). Faktor-Faktor yang Berhubungan dengan Perilaku Konsumsi Buah dan Sayur. *Gorontalo Journal Health and Science Community*, *8*(2), 69-81. <https://doi.org/10.35971/gojhes.v8i2>
- Kaewpradup, T., Tangmongkhonsuk, M., Chusak, C., Siervo, M., & Adisakwattana, S. (2024). Examining Sociodemographic Factors, Reasons, and Barriers in the Diversity of Fruit and Vegetable Intake among Undergraduate Students. *Nutrients*, *16*(6), 1-16. <https://doi.org/10.3390/nu16060779>
- Lemeshow, S., Hosmer, D. W., Klar, J., & Lwanga, S. K. (1997). *Adequacy of sample size in health studies*. John Wiley & Sons.
- Li, X., Braakhuis, A., Li, Z., & Roy, R. (2022). How Does the University Food Environment Impact Student Dietary Behaviors? A Systematic Review. *Frontiers in Nutrition*, *9*, 1-13. <https://doi.org/10.3389/fnut.2022.840818>
- Nurfadillah, A. R., & Kimun, S. A. (2024). Pengaruh Uang Saku dan Dukungan Teman Sebaya Terhadap Konsumsi Sayur dan Buah (Studi pada Mahasiswa Kost). *Jurnal Kolaboratif Sains*, *7*(5), 1738–1743. <https://doi.org/10.56338/jks.v7i5.5339>
- Nyanchoka, M. A., Stuijvenberg, M. E. Van, Tambe, A. B., Zuma, M. K., & Mbhenyane, X. G. (2022). Fruit and Vegetable Consumption Patterns and Risk of Chronic Diseases of Lifestyle among University Students in Kenya. *International Journal of Environmental Research and Public Health*, *19*(12), 1-19. <https://doi.org/10.3390/ijerph19126965>
- Palamutoglu, M. I., Gok, F. R., & Agir, G. (2024). The impact of university students' accommodation environments on their dietary choices the impact of university students' accommodation environments on their dietary choices. *Food and Health*, *10*(2), 149–159. <https://doi.org/10.3153/FH24014>

- Peltzer, K., & Pengpid, S. (2015). Correlates of healthy fruit and vegetable diet in students in low, middle, and high income countries. *International Journal of Public Health*, 60(1), 79–90. <https://doi.org/10.1007/s00038-014-0631-1>
- Ramadhan, I., Muhammad, Yuliati, Y., & Jamroni, M. (2025). *Pengaruh Gender Terhadap Konsumsi Buah dan Sayur Pada Mahasiswa Fakultas Pertanian Universitas Brawijaya Malang*. <https://repository.ub.ac.id/id/eprint/239038/>
- Safitriani, & Masnina, R. (2022). Hubungan Ketersediaan Buah dan Sayur dengan Konsumsi Buah dan Sayur pada Mahasiswa Kesehatan di Universitas Muhammadiyah Kalimantan Timur. *Borneo Student Research*, 3(2), 1711–1718. <https://journals.umkt.ac.id/index.php/bsr/article/view/2358>
- Savitri, N. P. D. (2019). *Hubungan Sikap Remaja dan Preferensi Makanan dengan Pola Konsumsi Sayur dan Buah di SMPN 2 Kuta Utara*. https://repository.itekes-bali.ac.id/medias/journal/NI_PUTU_DEWI_SAVITRI.pdf
- Spronk, I., Kullen, C., Burdon, C., & O'Connor, H. (2014). Relationship between nutrition knowledge and dietary intake. *British Journal of Nutrition*, 111(10), 1713–1726. <https://doi.org/10.1017/S0007114514000087>
- Tazhkia, N. (2023). *Hubungan Tingkat Pengetahuan Gizi dan Perilaku Penerapan Konsumsi Sayur dan Buah dengan Status Gizi pada Mahasiswa Universitas Bhayangkara Bekasi*. https://repository.stikesmitrakeluarga.ac.id/index.php?p=show_detail&id=1147&keywords=
- Ushula, T. W., Mamun, A., Darssan, D., Wang, W. Y. S., Williams, G. M., Whiting, S. J., & Najman, J. M. (2023). Dietary patterns explaining variations in blood biomarkers in young adults are associated with the 30-year predicted cardiovascular disease risks in midlife: A follow-up study. *Nutrition, Metabolism and Cardiovascular Diseases*, 33(5), 1007–1018. <https://doi.org/10.1016/j.numecd.2023.02.019>
- Wahyuni, S., Aji, A., Triastanti, R. K., & Herawati, H. D. (2024). The Association Between Preference and Consumption of Vegetables and Fruits on Health and Non-Health University Students in Yogyakarta, Indonesia. *Journal of Global Nutrition*, 4(1), 294-303. <https://doi.org/10.53823/jgn.v4i1.82>
- WHO. (2023). *Increasing fruit and vegetable consumption to reduce the risk of noncommunicable diseases*. E-Library of Evidence for Nutrition Actions. <https://www.who.int/tools/elena/interventions/fruit-vegetables-ncds>
- WHO. (2024). *Standard STEPS instrument*. <https://www.who.int/publications/m/item/standard-steps-instrument>
- Yufa, S. P., & Prayoga, D. (2024). Factors that Affect Demand Creation for Health Services: Literature Review. *Media Publikasi Promosi Kesehatan Indonesia*, 7(6), 1385–1394. <https://doi.org/10.56338/mparki.v7i6.5214>