



Fruit and vegetable rejection among obese boarding house students

Syafika El Nabila, Lini Anisfatus Sholihah*

Nutrition Study Program, Faculty of Sport and Health Sciences, Universitas Negeri Surabaya, Jalan Lidah
Wetan Lakarsantri, Jawa Timur, 60213, Indonesia

*Correspondence: linisholihah@unesa.ac.id

ABSTRAK

Latar Belakang: Buah dan sayur cenderung enggan dikonsumsi oleh mahasiswa obesitas penghuni indekos yang dapat memperparah obesitas dan konsekuensinya.

Tujuan: Penelitian ini mengeksplorasi determinan penolakan konsumsi buah dan sayur menggunakan Model Green dengan mengklasifikasikannya ke dalam tiga kategori: faktor predisposisi (pengetahuan, sikap, dan nilai), faktor pemungkin (fasilitas dan akses), serta faktor penguat (dukungan sosial).

Metode: Penelitian ini menggunakan pendekatan kualitatif dengan desain fenomenologi. Sebanyak delapan partisipan direkrut: tiga mahasiswa obesitas yang menolak mengonsumsi buah dan sayur dipilih melalui purposive sampling, serta lima partisipan pendukung (orang tua, teman sebaya, dan tenaga kesehatan) yang direkrut melalui snowball sampling. Triangulasi sumber dan interpreter diterapkan untuk meningkatkan kredibilitas data. Data wawancara ditranskrip, dianalisis secara manual, dan ditematisasi dalam kerangka Model Green.

Hasil: Pada faktor predisposisi, penolakan didominasi oleh peran sensori, pengalaman masa lalu, dan rendahnya prioritas. Pada faktor pendukung, penolakan terutama dipengaruhi oleh keterbatasan dalam penyimpanan dan penyajian. Faktor penguat cenderung berperan secara dinamis, namun terbatas dalam mendorong konsumsi buah dan sayur. Sikap negatif menjadi faktor dominan yang memperkuat hambatan akses terhadap faktor pendukung dan melemahkan pengaruh sosial terhadap faktor penguat.

Kesimpulan: Temuan ini mengidentifikasi sensitivitas sensori sebagai hambatan utama serta sebagai titik fokus potensial untuk intervensi. Penelitian lebih lanjut diperlukan untuk mengatasi sensitivitas sensori melalui pelatihan atau strategi modifikasi makanan. Pemahaman terhadap pola penolakan ini penting untuk merancang intervensi yang kontekstual dan efektif dalam pencegahan obesitas pada remaja dan dewasa awal.

KATA KUNCI: buah dan sayur; indekos; mahasiswa; obesitas; penolakan

ABSTRACT

Background: Fruits and vegetables tend to be under-consumed among obese students living in boarding houses which may exacerbate obesity and its associated consequences.

Objectives To explore the determinants underlying fruit and vegetable rejection using the Green Model, which classifies the determinants into three factors: predisposing (knowledge, attitudes, and values), enabling (facilities and access), and reinforcing factors (social support).

Methods: This qualitative study used a phenomenological design to explore obese students' lived experiences in a boarding house in Surabaya through in-depth interviews. A total of eight participants were recruited: three obese students who rejected fruits and vegetables, selected through purposive sampling, and five supporting participants (parents, peers, and a healthcare worker) recruited via snowball sampling. Source and interpreter triangulations were applied to enhance data credibility. All interviews were transcribed, manually coded, and thematically analyzed using the Green Model framework.

Results: Predisposing factors are dominated by sensory roles, past experiences, and negative priorities. Enabling factors are dominated by rejection, storage, and serving constraints. Reinforcing factors tend to play a dynamic and limited role in fruit and vegetable consumption. A negative attitude dominates rejection, strengthens accessibility barriers of enabling factors, and weakens social influence of reinforcing factors.

Conclusions: These findings identify sensory sensitivities as a major barrier and potential focal point for intervention. Further research is needed to address sensory sensitivities through training or food modification strategies. Understanding these patterns of rejection is crucial to designing contextualized and effective interventions for obesity prevention among youth.

KEYWORDS: boarding house; fruit and vegetables; obesity; rejection; students

Article info: Received July 10, 2025; 1st revision November 27, 2025; 2nd revision February 3, 2026; accepted February 6, 2026; available online September 30, 2026; published September 30, 2026.

INTRODUCTION

Obesity has emerged as a critical global public health concern, with its prevalence consistently increasing worldwide, including in Indonesia. According to the World Health Organization, obesity is defined as excessive fat accumulation resulting from an imbalance between energy intake and expenditure. It is recognized as a major risk factor for various chronic non-communicable diseases (1). In Indonesia, obesity contributes to approximately 7.71% of chronic disease-related deaths, including hypertension, type 2 diabetes, cardiovascular disease, and other metabolic disorders (2). Data from the 2023 Indonesian Health Survey (SKI) indicate a rise in obesity prevalence among adults aged ≥ 18 years, increasing from 21.8% in 2018 to 23.4% in 2023 (3). The rising trend of obesity among young adults, particularly university students in the transition from adolescence to adulthood, defines a period of heightened vulnerability associated with increased dietary autonomy and lifestyle

changes (4). Lifestyle changes in the consumption of foods high in sugar and fat, combined with low intake of fruits and vegetables, are major contributors to the increasing obesity rates among college students (4–6). Students living independently in boarding houses receive inadequate dietary guidance, both through education and dietary monitoring (7). Safitriani and Musnina (2022) found that 74.1% of college students rarely consume fruits and vegetables and prefer calorie-dense, nutrient-poor foods (4,7). A continued unhealthy diet not only increases the risk of obesity, but also the possibility of metabolic complications such as insulin resistance and dyslipidemia.

The preliminary survey found fruit and vegetable rejection among obese students living in boarding houses. This behavior contributed to lower fruit and vegetable intake and is associated with the complexity of obesity, including metabolic syndrome (8). For students who are already obese, an uncontrolled diet while living in boarding

houses can exacerbate health conditions (4). Inadequate fruit and vegetable intake, along with excessive consumption of high-calorie, low-fiber foods, negatively affects weight management and overall metabolic health (9). Low fruit and vegetable consumption is attributed to a variety of interacting factors that shape college students' eating behaviours, including social dynamics, living conditions, and economic barriers (7,10).

Recent studies show that fruit and vegetable consumption among college students is influenced by factors that can be systematically categorised as personal (knowledge, self-perception, and preference), social (peer influence), and environmental (7,10–14). These findings confirm that fruit and vegetable rejection behaviour is shaped by complex determinants and remains under-explored through a qualitative approach. Thus, the subjective meanings and individual experiences underlying the behavior have not been fully revealed. This research used the Green model (1992) as an analytical framework to address these complexities. The model identified and classified determinants of health behaviour based on three factors: predisposing (knowledge, attitudes, values), enabling (facilities, access), and reinforcing factors (social support) (15). This model's multilevel approach provides a comprehensive conceptual framework for understanding the eating behavior of obese students in the context of boarding house life. Given the limited use of this model in analyzing fruit and vegetable rejection among obese college students, this study aimed to explore its determinants through the Green Model.

MATERIALS AND METHODS

Study Design and Data Collection

Data collection was conducted in Surabaya from March to April 2025 using qualitative methods with a phenomenological design. A phenomenological design was used as an appropriate method to explore the experiences and deep understanding behind individualised fruit and vegetable rejection. The research subjects consisted of three main participants obtained through purposive sampling and five supporting participants obtained through snowball sampling. The main participants met the following criteria: 1)

rejected consuming fruits and vegetables. Rejection was operationalized as a self-motivated and consistent avoidance of consuming fruits and vegetables, reflected in low frequency (1-3x/month) and portion (≤ 70 grams/ meal) despite availability; 2) college students aged 18-25 years; 3) BMI ≥ 25 kg/m² (obesity); and 4) lived in a boarding house. We recruited participants through online screening forms distributed via WhatsApp, Instagram, and Telegram. The form included questions assessing fruit and vegetable rejection, defined as self-reported avoidance despite availability, reflected in low consumption frequency ($\leq 1-2$ times per week) and minimal portion intake. Individuals who met these criteria and fulfilled other inclusion requirements were contacted to confirm their willingness to be interviewed for data collection.

Data were collected through in-depth interviews conducted by a single interviewer and lasted 50 minutes to one hour. The interviewer used an expert-validated interview guide followed by probing questions. A voice recorder was used to document the interviews. At the same time, the SQ-FFQ was administered to complement the qualitative data by objectively confirming the low quantity and poor quality of fruit and vegetable intake. These SQ-FFQ results were used to enrich the exploration and guide the interviewer in validating and deepening the discussion regarding their rejection behavior.

Data Trustworthiness

To ensure data validity, source and interpreter triangulation was carried out. First, Data were triangulated across multiple informants such as parents, peers, and healthcare workers. Parents and peers provided information related to the main participant's daily diet. In contrast, the healthcare worker, who had previously provided general health or nutrition services to the participants, offered clarification from a clinical perspective. In addition, L.A.S. and S.E.N. participated in a consensus discussion to code and interpret the data.

Ethical Approval

The research was verified by the Universitas Airlangga Faculty of Dental Medicine Health Research Ethical Clearance Commission (Ethic

Code: 0397/HRECC.FODM/III/2025). The study purpose was explained before each interview. The study upheld informed consent, confidentiality, anonymity, and the right to withdraw.

Data Analysis

All interview recordings were transcribed using Transcript.id and manually verified by the researcher for accuracy. Data were analyzed manually using thematic analysis. Codes were developed inductively, then categorized and grouped into main themes. Two researchers independently coded the data to ensure reliability through intercoder agreement. Categories and themes were mapped onto the three components of the Green Model: predisposing, enabling, and reinforcing factors (15). Themes were then verified to ensure they accurately reflected participants' actual experiences.

RESULTS AND DISCUSSIONS

Characteristics of the Participants

Table 1 describes the characteristics of the key informants while **Table 2** describes the supporting informants. The key informants reported differing lengths of residence in boarding houses, with some relocating up to three or even

eight times over the past three years. Across these relocations, they perceived changes in the boarding house environment that influenced their daily dietary intake and food choices. Consistent with previous studies, students living in boarding houses exhibited low fruit and vegetable intake (7,10). They reported that relocating to a boarding house during university shifted their dietary patterns, as changes in physical and social environments shaped their eating behavior. Participants frequently set aside or gave away vegetables during shared meals. We observed that in the fruit groups, avocado, yam bean, dragon fruit, guava, mango, melon, banana, papaya, watermelon, and soursop were set aside or given away (as depicted in Table 3); meanwhile, in the vegetable groups, chickpeas, spinach, eggplant, carrot, kale, moringa, cabbage, and bitter melon were set aside or given away.

"There are more things I can't eat, as well as fruit. There are also more vegetables that I can't eat..." [QN-11]

"It can be in 1 week not eating fruits and vegetables at all, the point is that fried foods are often eaten..." [GN-12]

"... more often eat like pentol, snacks, fried animals, like that..." [NA-13].

Table 1. Characteristics of key informants

Characteristics	Participant Initials Name		
	QN*	GN*	NA*
Age (year)	21	20	20
Gender	Female	Male	Female
BMI (kg/m ²)	33.5	28.9	30.5
Length of stay in boarding house (year)	3.5	2.5	3.5

*respondent's initials

Table 2. Characteristics of supporting informants

Characteristics	Participant Initials Name				
	MQ*	NN*	MG*	FZ*	PN*
Age (year)	46	21	52	20	28
Gender	Female	Female	Female	Male	Female
The role	Parent	Peer	Parent	Peer	Healthcare worker

*respondent's initials

The rejection of fruit and vegetable consumption was closely linked to participants' obesity status. Evidence shows that inadequate intake of these foods exacerbates obesity-related conditions due to insufficient vitamins, minerals, and dietary fiber essential for metabolic regulation (17,18), while

also promoting selection of high-energy alternatives (19). In this study, participants predominantly consumed high-fat and high-sugar foods, which elevate lipid and glucose levels (8,20) and, over time, increase the risk of non-communicable diseases (21). The coexistence of

obesity and poor diet quality thus contributes substantially to comorbidity risk. Avoidance of fruits and vegetables appeared to be influenced by strong preferences for “comfort foods” that provide emotional relief (22), as sweet and fatty foods generate heightened pleasure responses in the

brain (23), reinforcing persistent resistance to healthier choices (24). Participants also perceived that high-energy-density foods sufficiently met satiety needs, reducing motivation to consume fruits and vegetables as sources of fiber and micronutrients.

Table 3. Types of fruits and vegetables refused for consumption

Type of Food	Participant Initials Name		
	QN*	GN*	NA*
Fruits	Avocado, guava	Melon	Dragon fruit
	Yam bean, melon	Papaya	Melon
	Dragon fruit	Watermelon	Watermelon
	Mango, Banana		Soursop
Vegetables	Chickpeas	Spinach, cabbage	Broccoli, mustard
	Spinach	Chickpeas	Basil, Bok choy
	Eggplant	Kale, bitter melon	Cauliflower
	Carrot	Moringa	Cabbage, lettuce
		Bean sprout	Eggplant, tomato
		Carrot	Cucumber, carrot

**respondent's initials*

Rejection of Fruits and Vegetables Consumption Based on the Green Model

The factors contributing to fruit and vegetable rejection were analyzed using the Green Model framework: predisposing, enabling, and reinforcing factors. Analysis of interview data identified thirteen codes, grouped into six categories and further synthesised into three

themes aligned with the Green Model constructs (15). These findings show that rejection of fruit and vegetable consumption is an adaptive response to the interaction of predisposing, enabling, and reinforcing factors. **Table 4** presents the codes, categories, and themes of the research findings, which are subsequently referenced and discussed in detail in the following results and discussion.

Table 4. Codes, categories, and themes of research findings

Code	Category	Theme
Fruit and vegetable functions	Knowledge Attitude	Predisposing factors
Sensory		
Negative past experiences		
Priority	Accessibility	Enabling factors
Fruit and vegetable availability		
Storage and serving constraints		
Access to information		
Availability of funds	Family	Reinforcing factors
Food service		
Instructions		
Influence of friends on eating	Peers	
Educational exposure	Healthcare worker	
Health impact		

Predisposing Factors

Category 1: Knowledge

Participants recognized that fruits and vegetables contribute to nutritional balance through their fiber, antioxidant, and mineral content. This reflects the knowledge-based predisposing factor within the Green Model, yet such knowledge was

insufficiently strong or actionable, as it did not translate into consistent healthy eating behaviors. This suggests that knowledge alone is inadequate without reinforcement from psychosocial factors such as attitudes, perceived benefits, and self-efficacy (24). Although some participants articulated nutritional reasoning, its practical

application remained limited, indicating that the intensity and quality of information exposure may shape the robustness of knowledge and perceptions. This aligns with evidence showing that greater information exposure promotes more positive health attitudes and behaviors (25,26).

"Some nutrients must be met from fruits... from vegetables... and cannot be found from other food sources anyway..." [QN-I1]

"Well, vegetables are high in fiber and also antioxidants, there are minerals too. But, vegetable A does not have the same nutritional content as vegetable B. So, this vegetable needs to be accompanied by fruit because the content is not the same, not equal." [NA-I3].

Predisposing Factors

Category 2: Attitude

Participants tended to avoid specific fruits and vegetables due to sensory factors such as texture, taste, aroma, and appearance. Soft or overly firm textures, watery or draggy mouthfeel, inconsistent bitterness, and pungent odors were commonly cited as triggers of aversion, particularly when fruits and vegetables were served in their original form. These patterns suggest heightened sensory sensitivity. From a neurological perspective, individuals with obesity show altered responses to texture and moisture, consistent with the avoidance of fruits like watermelon and melon observed in this study (27). This aligns with

previous evidence that sensory perception is shaped by early-life experiences and intertwined with neurophysiological and emotional processes that influence dietary preferences (28-30).

"I can't eat it. Because it's really dragging. It's really bad when I finish chewing it. I spit it out again..." [QN-I1]

"I don't like it because it's too mushy and smelly for me." [GN-I2]

"A bit skeptical about crispy vegetables. How strange!" [NA-I3]

"Papaya smells like a sink full of stuff, makes me gag with the smell." [GN-I2]

"... slimy, grainy, like it's going to rot. That makes me really don't want it." [GN-I2].

Participants reported strong aversions to fruits and vegetables rooted in childhood experiences, such as encountering caterpillars in vegetables, nausea or vomiting after consumption, and discomfort with fruit–side-dish combinations. These memories reflect food neophobia: avoidance of foods perceived as unfamiliar or previously unpleasant, which functions as a predisposing factor in the Green Model by shaping long-term attitudes and emotional responses toward food. Consistent with Karaağaç and Bellikci-Koyu (2022), higher food neophobia is associated with rejecting foods linked to past negative encounters, ultimately reducing dietary variety and overall diet quality (31).

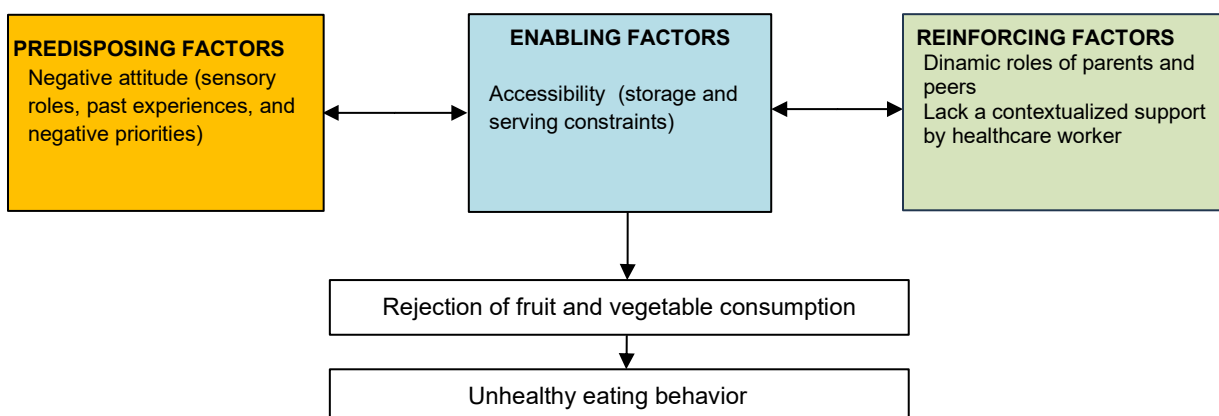


Figure 1. Interaction of predisposing, enabling, and reinforcing factors in fruit and vegetable consumption rejection behavior among obese college students

"I once ate chickpeas and it turned out that there was a caterpillar inside, so I don't want to eat anymore until now." [QN-I1]

"Then I tried to eat it again, but suddenly it tasted strange too, like iron..." [QN-I1]

"... like bitter, yeah, like it's not good, like there's no taste. Yeah, in my opinion, when I was a kid, it was weird, so I avoided it the most..." [GN-I2]

"If it tastes bitter, unpleasant, and this makes me nauseous..." [GN-I2]

"There is a trauma that absorbs the smell of side dish spices from others." [NA-I3]

Negative sensory experiences shaped long-term perceptions, leading participants to view fruits and vegetables as non-priority foods. All three participants consistently reported low motivation to consume them. This aligns with Dantec et al. (2021), who found that adverse perceptions lessen interest in particular foods and reduce their likelihood of becoming preferred dietary choices (30).

"... not my priority. So it's not really like that, I don't consume it like that." [QN-I1]

"Like it's impossible for me to eat every day anyway." [GN-I2]

"It's just that because of the internal problem, I have no appetite for eating fruits and vegetables." [NA-I3]

Enabling factors

Category: Accessibility

Participants reported that fruits and vegetables were geographically accessible in urban Surabaya, with markets and vendors located nearby. However, within the Green Model, enabling factors extend beyond physical availability to include perceived practicality and environmental supports that may facilitate or hinder consumption.

"... near my boarding house, there are people who sell unpeeled fruit." [QN-I1]

"If this is considered quite difficult, it's actually not. Because just outside the alley is the fruit market." [GN-I2]

Despite physical access, limited preparation facilities and time constraints discouraged fruit and vegetable consumption. Tasks such as cutting, storing, and cleaning were viewed as impractical without a kitchen, refrigerator, or basic

utensils in boarding houses. This absence of a supportive food environment made it difficult for participants to incorporate fruits and vegetables into daily routines. Previous studies show that environmental support is essential for translating availability into actual intake (32,33), highlighting a gap between access and enabling conditions within the Green Model.

"... eating fruit is complicated. Like I have to cut it. Then the water goes everywhere [...] if I buy my own fruit, it's really big. I don't want to" [QN-I1]

"There is no kitchen in the boarding house, I also don't bring kitchen tools, so it makes me lazy, but if I buy cut fruit, I'm also lazy too..." [NA-I3]

Participants accessed nutrition information through various social media platforms, yet this exposure did not translate into sustained behavior change. Although media content functions as an enabling factor in the Green Model, its influence was limited without supportive social environments that model healthy eating. This aligns with Jindaratnaporn et al. (2023), who note that health literacy requires interpersonal reinforcement to shape dietary behaviour (34). In this study, frequent exposure to health messages was insufficient to counter existing negative attitudes and the lack of social encouragement for fruit and vegetable consumption.

"... from online, from social media mostly." [QN-I1]

"Actually from YouTube, yes, from information media, to be more precise, I often get it through social media too, like TikTok, there are fyp like videos." [GN-I2]

"So I mostly got by online..." [NA-I3]

Participants also received financial support, including additional funds designated for purchasing fruits and vegetables. However, this resource did not lead to healthier choices, as negative attitudes and perceived discomfort limited its use. Within the Green Model, enabling factors extend beyond resource availability to their actual integration into behavior. Thus, financial access alone was insufficient to overcome existing barriers or motivate fruit and vegetable consumption (35).

"... sometimes my mom even gives me money outside of my pocket. Mom gives

money with a note to buy fruits and vegetables." [NA-I3]

"Then my mom said 'I will add you this money'..." [GN-I2]

Reinforcing Factors

Category 1: Family

Within the Green Model, reinforcing factors reflect social influences that shape and sustain health behaviors. In this study, parental reinforcement was ambivalent. Parents unintentionally strengthened unhealthy preferences by bringing sugary or high-fat foods during visits to the boarding house, thereby weakening positive reinforcement for fruit and vegetable intake among participants with already low preferences.

"Usually when mom visits the boarding house, she brings snacks, sometimes toast or martabak, and buys other fatty food." [GN-I2]

"They usually visit. Well, usually mom only brings bread. Some I eat myself, some I take to campus." [NA-I3]

While at home, parents routinely served fruits and vegetables, yet this exposure did not internalize into lasting habits. Participants still felt free to avoid them, indicating that parental reinforcement was insufficient to sustain long-term behavioral change.

"... At the boarding house it is rarely visited, but at home I am usually provided with vegetables by my mother, even though I still don't eat them, I put them on the edge of the plate anyway. My mom still prepares the food..." [GN-I2]

Parental reinforcement intensified only during periods of illness, when advice and instructions became more directive. This compliance was temporary and externally driven, indicating that reinforcement lacked consistency and internalization (36). According to the Green Model, such short-term reinforcement is insufficient to establish sustained dietary habits, reflecting parents' dual role as both supportive and inhibiting influences on fruit and vegetable consumption (37).

"When I was sick, my mom told me to insist on drinking guava juice. Because my platelets were down, even though I really didn't like it." [QN-I1]

"If I have eaten a bad, messy meal, I usually get a lecture and a warning from my mom because I don't eat vegetables and no fruit: 'You should eat right.'" [GN-I2]

Category 2: Peers

Peer influence operated ambivalently, acting as both a reinforcing and inhibiting factor. Social routines such as hanging out, drinking coffee, and sharing fast or instant foods created group norms that marginalized fruit and vegetable consumption and further reinforced avoidance. Conversely, positive peer pressure occasionally encouraged healthier choices, particularly when friends modeled healthy eating. Based on previous studies, this reinforcement was situational and subtle, with limited lasting influence without strong internal motivation (38).

"Actually, when discussing roles, whether the role is strong or not, there is actually an influence, but the role of friends is not that influential because they just remind me." [GN-I2]

"It's like how come you don't want to, you're picky. How come you don't want to eat vegetables. Especially with close friends, sometimes if we eat something with vegetables, we don't set it aside..." [NA-I3]

In some cases, participants consumed minimal amounts of fruits or vegetables solely to maintain social harmony rather than out of genuine intention. As illustrated by one participant,

"...so I took vegetables and put them aside... sometimes I take less than one spoon just for appreciation" [GN-I2]

Participants' decisions to consume fruits or vegetables in social settings were primarily motivated by the need to maintain social harmony, such as shyness or politeness, rather than a genuine intention to change eating habits. Consumption occurred to appear appreciative or accepting of peers' invitations. This indicates that peer influence operates situationally and is highly context-dependent (39). As shown in previous studies, peer influence played a stronger role than family influence in shaping eating habits among college students (40).

Category 3: Healthcare Worker

All participants were aware of the health risks associated with inadequate fruit and vegetable

intake, reflecting predisposing knowledge. Healthcare workers acted as reinforcing agents by repeatedly providing nutritional advice, yet this reinforcement had limited behavioral impact. Consistent with the Green Model, advice alone was insufficient without enabling conditions such as sensory tolerance, supportive environments, or social facilitation. Participants reported difficulty applying recommendations because of physical discomfort or persistent aversion, highlighting a gap between knowledge, reinforcement, and actual behaviour.

"...at that time I was advised to eat avocados. Even the doctor told me to eat vegetables and have to eat soup for 1 week. But I couldn't, because it made me vomit." [GN-I2]

"Whether health workers say that eating less vegetables causes constipation or cancer, I still can't change my behavior to like vegetables." [NA-I3]

"My doctor is an obgyn, at that time she advised me to control my diet to regulate my hormone problems, I was told to eat vegetables to eat healthier." [QN-I1]

This aligns with Patwardhan et al. (2024), who noted that health education increases intention but rarely leads to long-term dietary change without sustained social support and internalized motivation (41). This study examines the rejection of fruit and vegetable consumption among urban university students in Surabaya. Although Focus Group Discussions (FGDs) were planned as a triangulation method to strengthen the data, the FGDs could not be implemented because the number of willing participants did not meet the minimum requirements. This limited the chance to explore group perspectives on contributing factors and possible solutions. Nevertheless, the individual interview data still provide clear and meaningful insights into the patterns and reasons behind students' rejection of fruit and vegetables, even with the smaller range of viewpoints.

CONCLUSION AND RECOMMENDATION

This study shows that fruit and vegetable rejection among obese students is shaped by the interaction of predisposing, enabling, and reinforcing factors within the Green Model framework. Negative sensory attitudes, past

aversive experiences, and low prioritization of fruits and vegetables emerged as dominant predisposing barriers. Limited environmental support, such as inadequate preparation facilities, and weakened social reinforcement amplified these tendencies, creating a cycle that sustained avoidance. Intervention opportunities should address multiple determinants, not only sensory sensitivity. Potential strategies include gradual sensory exposure, modifying preparation techniques to improve palatability, enhancing access to ready-to-eat options, and strengthening peer and family reinforcement. Understanding these interconnected drivers is essential for developing contextualized interventions to improve dietary patterns and support obesity prevention among youth.

REFERENCES

1. Lin X, Li H. Obesity: Epidemiology, Pathophysiology, and Therapeutics. *Front Endocrinol (Lausanne)*. 2021. 12. 1–9. <https://doi.org/10.3389/fendo.2021.706978>
2. Kemenkes RI. Panduan Hari Obesitas Sedunia. Ditjen Pencegahan dan Pengendalian Penyakit. Jakarta: Kementerian Kesehatan Republik Indonesia; 2023.
3. Kemenkes RI. Survei Kesehatan Indonesia (SKI) Dalam Angka. Kemenkes BKKP. 2023.
4. Rahadian FA, Wahyuningsih U, Simanungkalit SF. Factors Associated with the Incidence of Obesity among College Students at Fakultas Ilmu Kesehatan Universitas Pembangunan Nasional "Veteran" Jakarta. *Amerta Nutr*. 2024. 8(3). 24–34. <https://doi.org/10.20473/amnt.v8i3SP.2024.24-34>
5. Wicaksari SA, Chandra DN, Khusun H, Sunardi D. Nutritional Status, Sugar Sweetened Beverage Consumption and Physical Activity Level in Male and Female College Students Living in Dormitory. *J Community Empower Heal*. 2024. 7(2). 81–86. <https://doi.org/10.22146/jcoemph.86500>
6. Paramastuti R, Rachma YA, Kamil RZ. The Paradox of Knowledge and Practice: Nutritional Status and Diet Quality Among Indonesian Food and Nutrition Science

- Students. *J Appl Food Technol.* 2023. 12(1). 39–44. <https://doi.org/10.17728/jaft.26985>
7. Safitriani, Masnina R. Hubungan Ketersediaan Buah dan Sayur dengan Konsumsi Buah dan Sayur pada Mahasiswa Kesehatan di Universitas Muhammadiyah Kalimantan Timur. *Borneo Student Res.* 2022.3(2).1711–1718. <https://journals.umkt.ac.id/index.php/bsr/article/view/2358>
8. Nawai F, Syaury A, Pramono A. Correlation of lipid profile, glucose, and body composition on insulin resistance in overweight and obese subjects. *Korelasi profil lipid , glukosa , dan komposisi tubuh , terhadap resistensi insulin subjek kelebihan berat badan dan obesitas Abstrak. AcTion Aceh Nutr J.* 2024. 9(1). 141–149. <https://doi.org/10.30867/action.v9i1.1571>
9. Devirgiliis C, Guberti E, Mistura L, Raffo A. Effect of Fruit and Vegetable Consumption on Human Health: An Update of the Literature. *Foods.* 2024. 13(19). 1–17. <https://doi.org/10.3390/foods13193149>
10. Nurfadillah AR, Kimun SA. Pengaruh Uang Saku dan Dukungan Teman Sebaya Terhadap Konsumsi Sayur dan Buah (Studi pada Mahasiswa Kost) The Influence of Pocket Money and Peer Support on Vegetable and Fruit Consumption (Study on Boarding School Students). *J Kolaboratif Sains.* 2024. 7(5). 1738–1743. <https://doi.org/10.56338/jks.v7i5.5339>
11. Bakhtiar A, Afwihi MR, Sudibyo RP. Analisis Faktor-Faktor yang Mempengaruhi Tingkat Konsumsi Buah dan Sayur Bagi Mahasiswa Program Studi Agribisnis Universitas Muhammadiyah Malang. *J Agribus Sci.* 2020. 3(2). 105–111. <https://doi.org/10.30596/jasc.v3i2.4738>
12. Aziza KN, Farhat DY, Sarjana P, Gizi T, Jurusan D, Poltekkes G, et al. Hubungan sikap dan konsumsi junk food dengan konsumsi sayur dan buah pada mahasiswa jurusan gizi. *J Ris Pangan dan Gizi.* 2021. 3(2). 9-16. <https://doi.org/10.31964/jrpanzi.v3i2.97>
13. Veranita D, Masnina R, Budiman A. Hubungan Teman Sebaya dengan Konsumsi Buah dan Kesehatan di Universitas Muhammadiyah Kalimantan Timur. *Borneo Student Res.* 2022. 3(2). 1502–1508. <https://journals.umkt.ac.id/index.php/bsr/article/view/2656>
14. Awaliya HBP, Pradigdo SF, Nugraheni SA. Kurangnya Konsumsi Buah dan Sayur Sebagai Faktor Risiko Kejadian Overweight Pada Remaja Putri (Studi pada Mahasiswi di Salah Satu Universitas di Kota Semarang). *J Ilm Mhs.* 2020. 10(2). 34–38. <https://ejournal.undip.ac.id/index.php/jim/index>
15. Green, L. W. Kreuter MW. *Health Promotion Planning: An Educational and Environmental Approach.* 2nd Edition. 1992. Palo Alto: Mayfield Publishing Co.
16. Kemenkes RI. Kepmenkes RI no HK.01.07/MENKES/1928/2022 Tentang Pedoman Nasional Pelayanan Kedokteran Tata Laksana Stunting. 2022;1–52.
17. Nouri M, Shateri Z, Faghieh S. The relationship between intake of fruits, vegetables and dairy products with overweight and obesity in a large sample in Iran: Findings of STEPS 2016. *Front Nutr.* 2023.9.1–9. <https://doi.org/10.3389/fnut.2022.1082976>
18. Mariana Del Carmen Fernández-Figares J. A Whole Plant–Foods Diet in the Prevention and Treatment of Overweight and Obesity: From Empirical Evidence to Potential Mechanisms. *J Am Nutr Assoc.* 2025. 44(2). 137–155. <https://doi.org/10.1080/27697061.2024.2406887>
19. Livingstone KM, Sexton-Dhamu MJ, Pendergast FJ, Worsley A, Brayner B, McNaughton SA. Energy-dense dietary patterns high in free sugars and saturated fat and associations with obesity in young adults. *Eur J Nutr.* 2022. 61(3). 1595–1607. <https://doi.org/10.1007/s00394-021-02758-y>
20. Al-Shami I, Al-Dalaeen A, Agraib LM, Alkhatib B. Obesity indices may affect and reflect the blood glucose and lipid profile values. *Healthc Low-Resource Settings.* 2025.13(1).52–58. <https://doi.org/10.4081/hls.2024.12865>
21. Wang L, Yan N, Zhang M, Pan R, Dang Y, Niu Y. The association between blood

- glucose levels and lipids or lipid ratios in type 2 diabetes patients: A cross-sectional study. *Front Endocrinol (Lausanne)*. 2022. 13. 1–10. <https://doi.org/10.3389/fendo.2022.969080>
22. Fuente González CE, Chávez-Servín JL, De La Torre-Carbot K, Ronquillo González D, Aguilera Barreiro MDLÁ, Ojeda Navarro LR. Relationship between Emotional Eating, Consumption of Hyperpalatable Energy-Dense Foods, and Indicators of Nutritional Status: A Systematic Review. *J Obes*. 2022. <https://doi.org/10.1155/2022/4243868>
23. Jacques A, Chaaya N, Beecher K, Ali SA, Belmer A, Bartlett S. The impact of sugar consumption on stress driven, emotional and addictive behaviors. *Neurosci Biobehav Rev*. 2019.103.178–199. <https://doi.org/10.1016/j.neubiorev.2019.05.021>
24. Gearhardt AN, Hebebrand J. The concept of “food addiction” helps inform the understanding of overeating and obesity: Debate Consensus. *Am J Clin Nutr*. 2021. 113(2).274–276. <https://doi.org/10.1093/ajcn/nqaa345>
25. Wu J, Yu W, Xu Z, Chen Y, Li J. Dietary Knowledge, Attitude, Practice Survey and Nutritional Knowledge-Based Intervention: A Cross-Sectional and Randomized Controlled Trial Study among College Undergraduates in China. *Nutrients*. 2024. 16. 1–15. <https://doi.org/10.3390/nu16142365>
26. Marniati, Anwar C, Mauliza P. Associations between knowledge, attitudes, junk food consumption, and obesity risk among productive age adults in Aceh, Indonesia. *Jurnal AcTion: Aceh Nutrition Journal*. 2025. 10(4). 1074-1081. <https://doi.org/10.30867/action.v10i4.2998>
27. Appleton KM, Newbury A, Almiron-Roig E, Yeomans MR, Brunstrom JM, de Graaf K, et al. Sensory and physical characteristics of foods that impact food intake without affecting acceptability: Systematic review and meta-analyses. *Obes Rev*. 2021. 22(8). 1–22. <https://doi.org/10.1111/obr.13234>
28. Peng-Li D, Alves Da Mota P, Correa CMC, Chan RCK, Byrne DV, Wang QJ. “Sound” Decisions: The Combined Role of Ambient Noise and Cognitive Regulation on the Neurophysiology of Food Cravings. *Front Neurosci*.2022.16.1–16. <https://doi.org/10.3389/fnins.2022.827021>
29. Hamid N, Lin YHT, Dai Y, Shepherd D, Kantono K. Flavourful Clips: The impact of auditory cues on flavour perception and emotions during food consumption. 7 Conf Proc Transform Exp beyond borders Partnersh Dev Sustain Futur. 2024. 4. 100–105. <https://doi.org/10.24135/7es.27>
30. Dantec M, Mantel M, Lafraire J, Rouby C, Bensafi M. On the contribution of the senses to food emotional experience. *Food Qual Prefer*.2021.92.104–120. <https://doi.org/10.1016/j.foodqual.2020.104120>
31. Karaağaç Y, Bellikci-Koyu E. A narrative review on food neophobia throughout the lifespan: Relationships with dietary behaviours and interventions to reduce it. *Br J Nutr*. 2023. 130(5). 793–826. <https://doi.org/10.1017/S000711452200371>
32. Çapar AG, Çelik N, Beşparmak A, Aykut M. Factors and Barriers Related To Fruit and Vegetable Consumption of University Students:Kayseri,Türkiye. *Eskişehir Türk Dünyası Uygul ve Araştırma Merk Halk Sağlığı Derg*. 2024. 9(1). 34–47. <https://doi.org/10.35232/estudamhdsd.1390144>
33. Hidayah SS, Pamungkasari EP, Sulaeman ES. Determinants of Fruits and Vegetables Consumption among Primary School Students: A Path Analysis Evidence. *J Heal Promot Behav*. 2019. 4(1). 64–75. <https://doi.org/10.26911/thejhp.2019.04.01.07>
34. Jindaratannaporn N, Rittirong J, Phulkerd S, Thapsuwan S, Thongcharoenchupong N. Are exposure to health information and media health literacy associated with fruit and vegetable consumption? *BMC Public Health*. 2023.23(1).1–11. <https://doi.org/10.1186/s12889-023-16474-1>
35. Yusufali Z, Aschenberg L, Juma S, Du X. Satiety Sensation and Its Associated Food Compositions and Flavors. Springer, Cham. 2024. https://doi.org/10.1007/978-3-031-51808-9_15

36. Costa A, Oliveira A. Parental Feeding Practices and Children's Eating Behaviours: An Overview of Their Complex Relationship. *Healthc.* 2023. 11(3). 1–15. <https://doi.org/10.3390/healthcare11030400>
37. Pasztak-Opiłka A, de Jonge R, Zachurzok A, Górnik-Durose ME. Adult attachment styles and mothers' life satisfaction in relation to eating behaviors in the families with overweight and obese children. *PLoS One.* 2020. 15. 1–15. Available from: <https://doi.org/10.1371/journal.pone.0243448>
38. Neufeld LM, Andrade EB, Ballonoff Suleiman A, Barker M, Beal T, Blum LS, et al. Food choice in transition: adolescent autonomy, agency, and the food environment. *Lancet.* 2022;399:185–197. [https://doi.org/10.1016/S01406736\(21\)01687-1](https://doi.org/10.1016/S01406736(21)01687-1)
39. Kennedy L. Explaining youth aggression: A situational model of peer influence. *Eur J Criminol.* 2025. 22(2). 172–203. <https://doi.org/10.1177/1477370824127252>
40. Jones A, Robinson E. The longitudinal associations between perceived descriptive peer norms and eating and drinking behavior: An initial examination in young adults. *Front Psychol.* 2017. 8(1). 1–7. <https://doi.org/10.3389/fpsyg.2017.00002>
41. Patwardhan V, Mallya J, S K, Kumar D. Influence of social media on young adults' food consumption behavior: scale development. *Cogent Soc Sci.* 2024. 10(1). 1–15. <https://doi.org/10.1080/23311886.2024.2391016>.