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Associations of balanced nutrition knowledge and food choice motives with eating behavior among public health students at Universitas Cenderawasih

Hubungan pengetahuan gizi seimbang dan motif pemilihan makanan dengan perilaku makan pada mahasiswa kesehatan masyarakat Universitas Cenderawasih

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Abstract

Background: Nutrition knowledge may not translate into healthy eating. Food choice motives and appetitive traits may contribute to this gap.
Objective: To examine associations of balanced nutrition knowledge and food choice motives with eating behavior and describe appetitive traits among public health students at Universitas Cenderawasih.
Methods: This cross-sectional study included 303 students selected by stratified random sampling. The Food Choice Questionnaire, Adult Eating Behavior Questionnaire, and nutrition knowledge and eating behavior questionnaires were administered. Associations were assessed using chi-square tests and odds ratios (ORs) with 95% confidence intervals (CIs).
Results: Overall, 53.5% of students had poor eating behavior. Prominent food choice motives were health (69.6%), natural content (71.9%), and weight control (72.3%). Enjoyment of food was high in 67.0%. Nutrition knowledge was not significantly associated with eating behavior (p = 0.393; OR = 1.23; 95% CI: 0.77–1.96). Food choice motives were associated with eating behavior (p = 0.003); students classified as having low food choice motives had greater odds of poor eating behavior (OR = 2.02; 95% CI: 1.27–3.22).
Conclusion: Food choice motives, but not nutrition knowledge, were associated with eating behavior. Campus nutrition programs may benefit from addressing food choice motivations alongside nutrition education.

Keywords:
Appetite, feeding behavior, food preferences, health behavior, students

Abstrak

Latar Belakang: Pengetahuan gizi belum tentu diwujudkan dalam perilaku makan sehat. Motif pemilihan makanan dan karakteristik nafsu makan mungkin turut menjelaskan kesenjangan tersebut.
Tujuan: Menganalisis hubungan pengetahuan gizi seimbang dan motif pemilihan makanan dengan perilaku makan serta mendeskripsikan karakteristik nafsu makan mahasiswa Fakultas Kesehatan Masyarakat Universitas Cenderawasih.
Metode: Penelitian potong lintang ini melibatkan 303 mahasiswa yang dipilih melalui pengambilan sampel acak berstrata. Data dikumpulkan menggunakan *Food Choice Questionnaire*, *Adult Eating Behavior Questionnaire*, serta kuesioner pengetahuan gizi dan perilaku makan. Hubungan antarvariabel dianalisis dengan uji chi-kuadrat dan rasio odds (OR) beserta interval kepercayaan (IK) 95%.
Hasil: Sebanyak 53,5% mahasiswa memiliki perilaku makan kurang baik. Motif pemilihan makanan yang menonjol meliputi kesehatan (69,6%), kandungan alami (71,9%), dan pengendalian berat badan (72,3%). Sebanyak 67,0% memiliki tingkat kenikmatan makan yang tinggi. Pengetahuan gizi tidak berhubungan secara bermakna dengan

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perilaku makan (p = 0,393; OR = 1,23; IK 95%: 0,77–1,96). Motif pemilihan makanan berhubungan dengan perilaku makan (p = 0,003); mahasiswa dengan motif pemilihan makanan kategori rendah memiliki odds perilaku makan kurang baik lebih besar (OR = 2,02; IK 95%: 1,27–3,22).
Kesimpulan: Motif pemilihan makanan, tetapi bukan pengetahuan gizi, berhubungan dengan perilaku makan. Program gizi di kampus dapat mempertimbangkan motivasi pemilihan makanan selain edukasi gizi.

Kata Kunci:
Mahasiswa, nafsu makan, perilaku kesehatan, perilaku makan, preferensi makanan

Introduction

University students, particularly those studying public health, are expected to understand nutrition recommendations and apply them in daily life as future health professionals. However, nutrition knowledge does not consistently correspond d to healthy dietary practices. Studies have described discrepancies between students' awareness of dietary recommendations and their eating behaviors (Berliandita & Hakim, 2021; Carrillo-González, 2025; Hadi et al., 2025; O'Leary et al., 2025; J. Zhang & Man, 2025). In Indonesia, students may recognize the importance of regular meals yet fail to achieve recommended energy intakes (Berliandita & Hakim, 2021). This knowledge–behavior gap indicates a need to examine additional factors associated with students' food-related decisions.

The transition to university often involves greater independence in food selection and meal planning. Irregular meal patterns, breakfast skipping, and frequent consumption of fast foods or energy-dense snacks may occur alongside academic demands, financial constraints, and limited food options (H. Zhang et al., 2025). Such dietary practices raise concerns about nutritional adequacy and long-term health. Understanding the factors associated with eating behavior may help inform nutrition promotion strategies suited to university populations.

Food choice motives provide one perspective on why individuals select particular foods. The Food Choice Questionnaire (FCQ) assesses nine dimensions: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concerns. Previous studies have reported associations between food choice motives and dietary practices (Daly et al., 2023; Falconet et al., 2025; Sahadeo et al., 2025; Wahyuningtyas et al., 2021). Because these motives reflect considerations that extend beyond nutrition knowledge, assessing both constructs may provide a more complete understanding of students' eating behavior.

Appetitive traits offer a complementary perspective by describing habitual responses to food and internal appetite cues. The Adult Eating Behavior Questionnaire (AEBQ) assesses four food-approach traits—hunger, emotional overeating, food responsiveness, and enjoyment of food—and four food-avoidance traits—food fussiness, satiety responsiveness, emotional undereating, and slowness in eating (Hunot et al., 2016; Hunot-Alexander et al., 2019). These characteristics may help describe individual differences in eating-related tendencies that are not fully captured by knowledge or reported food choice motives.

Social cognitive perspectives, the theory of planned behavior, and conceptual models of food choice emphasize that food-related decisions involve cognitive, motivational, social, and contextual considerations. Together, these perspectives provide a rationale for considering nutrition knowledge, food choice motives, and appetitive traits as distinct yet potentially complementary dimensions of eating behavior. However, investigating these dimensions within one study does not, by itself, establish how they interact or whether any has a causal effect on eating behavior.

Indonesian studies have examined nutrition knowledge, eating habits, and food-related motivations, but their coverage of these constructs varies (Berliandita & Hakim, 2021; Intani & Nurdiani, 2025; Wahyuningtyas et al., 2021). Evidence describing appetitive traits alongside nutrition knowledge and food choice motives among public health students in Eastern Indonesia is less clearly documented. Studying these dimensions in Papua may therefore add context-specific insight without assuming that findings from other university populations necessarily apply.

Accordingly, this study aimed to examine the associations of balanced nutrition knowledge and food choice motives with eating behavior and to describe appetitive traits among students at the Faculty of Public Health, Universitas Cenderawasih. Its contribution lies in considering cognitive and motivational factors alongside a descriptive profile of appetitive traits within the same student population. The findings may inform the development of context-sensitive campus nutrition promotion and identify questions for subsequent research.

Methods

A quantitative, cross-sectional study was conducted at the Faculty of Public Health, Universitas Cenderawasih, Jayapura, Papua, Indonesia. Ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Public Health, Universitas Cenderawasih (Approval No. 091/KEPK-FKM UC/2026). Written informed consent was obtained from all participants before data collection.

The study population comprised 1,256 active undergraduate students from the 2022–2024 entry cohorts. The sample size was estimated using Slovin's formula with a 5% margin of error, and 303 students were included in the study. Proportionate stratified sampling was applied to ensure representation across academic cohorts. Eligible participants were students in their fourth semester or higher who had completed the Basic Nutrition Science course, provided informed consent, and were able to complete the questionnaires independently. Students on academic leave, those experiencing acute illnesses that could affect eating behavior, and those who submitted incomplete questionnaires were excluded.

Data were collected using self-administered questionnaires assessing balanced nutrition knowledge, food choice motives, and eating behavior, including appetitive traits. Balanced nutrition knowledge and food choice motives were the independent variables, whereas eating behavior was the dependent variable. Appetitive traits were assessed descriptively.

Balanced nutrition knowledge was assessed using a 19-item questionnaire developed by Nuryani (2019), based on Indonesia's Balanced Nutrition Guidelines. The questionnaire covered nutrient functions, food sources, balanced nutrition principles, healthy eating habits, food preparation, physical activity, and weight monitoring. Correct responses were assigned a score of 1, whereas incorrect or unanswered items were assigned a score of 0, yielding a possible total score of 0–19. Each participant's mean item score was calculated, and knowledge was categorized as low or good using the overall sample mean as the cutoff. The instrument had a Cronbach's alpha coefficient of 0.688.

Eating behavior and appetitive traits were assessed using the 35-item Adult Eating Behavior Questionnaire (AEBQ), developed by Hunot et al. (2016) and adapted into Indonesian by Rimbawan (2022). Items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire assessed eight appetitive traits: hunger, food responsiveness, emotional overeating, enjoyment of food, satiety responsiveness, emotional undereating, food fussiness, and slowness in eating. In the present analysis, an overall mean score across the 35 items was calculated and dichotomized using the sample mean as the cutoff to classify eating behavior as poor or good. Mean scores for individual subscales were calculated to describe appetitive traits. The instrument had a Cronbach's alpha coefficient of 0.867.

Food choice motives were assessed using the 36-item Food Choice Questionnaire (FCQ), originally developed by Steptoe et al. (1995) and adapted by Pujiyanti (2023). Responses were recorded on a four-point Likert scale ranging from 1 (not at all important) to 4 (very important). The questionnaire covered nine dimensions: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concerns. An overall mean score was calculated for each participant and categorized as low or high using the sample mean as the cutoff. Mean scores for individual dimensions were used to describe the distribution of food choice motives. The instrument had a Cronbach's alpha coefficient of 0.951.

Data were analyzed using IBM SPSS Statistics. Descriptive statistics were used to summarize participant characteristics, balanced nutrition knowledge, food choice motives, eating behavior, and appetitive traits. Associations between balanced nutrition knowledge and eating behavior and between food choice motives and eating behavior were

examined using chi-square tests. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to estimate the magnitude and direction of these associations. Given the cross-sectional design, the ORs were interpreted as prevalence odds ratios. Variables were categorized using the sample-mean cutoffs described above.

Results

A total of 303 undergraduate students from the Faculty of Public Health, Universitas Cenderawasih, participated in the study. As shown in Table 1, most participants were female (82.8%), and 55.4% were aged 21 years or older. More than half lived without their parents (59.7%), while 73.3% reported a monthly allowance below the sample mean of IDR 522,000. Based on the reported body mass index (BMI) classification, 67.3% were categorized as having an abnormal BMI, and 32.7% were within the normal range.

Table 1. Characteristics of the respondents

Characteristic	f	%
Sex		
Male	52	17.2
Female	251	82.8
Age (years)		
Below 21	135	44.6
21 or older	168	55.4
Living arrangement		
Living without parents	181	59.7
Living with parents	122	40.3
Monthly allowance		
Below IDR 522,000	222	73.3
IDR 522,000 or above	81	26.7
BMI classification		
Abnormal (underweight or overweight, as reported)	204	67.3
Normal	99	32.7

Distribution of Nutrition Knowledge, Food Choice Motives, and Eating Behavior

Table 2 presents the distribution of the main study variables. Most participants were classified as having good balanced nutrition knowledge (62.7%), while 56.1% had high overall food choice motives. However, 53.5% were classified as having poor eating behavior based on the study's mean-derived cutoff.

Table 2. Distribution of the variables main study (n = 303)

Variable	f	%
Balanced nutrition knowledge		
Low (score below 11)	113	37.3
Good (score 11 or above)	190	62.7
Food choice motives		
Low (score below 116)	133	43.9
High (score 116 or above)	170	56.1
Eating behavior		
Poor (score below 107)	162	53.5
Good (score 107 or above)	141	46.5

Additional descriptive findings indicated that 76.24% of participants perceived a deterioration in their eating habits after entering university. Participants reported changes in meal frequency and dietary variety, with only 21.12% regularly consuming three meals per day. Regarding breakfast habits, 21.78% reported always eating breakfast, whereas 32.01% reported never eating breakfast. Additionally, 57.43% frequently consumed food after 9:00 p.m., and 41.58% reported consistently meeting recommended daily water intake. Nearly half (45.87%) reported consuming snacks more frequently than main meals.

Distribution of Food Choice Motives

The distribution of food choice motives across the nine Food Choice Questionnaire dimensions is presented in Table 3. Weight control had the highest proportion of participants classified in the high category (72.3%), followed by natural content (71.9%) and health (69.6%). High-category proportions for price, ethical concerns, and familiarity were 62.7%, 61.7%, and 61.4%, respectively. Smaller proportions were classified as high for mood (58.1%), convenience (56.4%), and sensory appeal (55.4%).

Table 3. Distribution of food choice motives by dimension (n = 303)

Dimension	Low, f (%)	High, f (%)	Cut off
Health	92 (30.4)	211 (69.6)	21
Mood	127 (41.9)	176 (58.1)	20
Convenience	132 (43.6)	171 (56.4)	16
Sensory appeal	135 (44.6)	168 (55.4)	13
Natural content	85 (28.1)	218 (71.9)	9
Price	113 (37.3)	190 (62.7)	10
Weight control	84 (27.7)	219 (72.3)	9
Familiarity	117 (38.6)	186 (61.4)	9
Ethical concerns	116 (38.3)	187 (61.7)	8

Distribution of Appetitive Traits

Table 4 summarizes the distribution of appetitive traits measured using the Adult Eating Behavior Questionnaire (AEBQ). Enjoyment of food was classified as high in 67.0% of participants, whereas emotional overeating was high in 23.4%. Among food-avoidance traits, emotional undereating and food fussiness were classified as high in 61.1% of participants each, followed by satiety responsiveness (60.7%) and slowness in eating (56.8%). Food responsiveness and hunger were more evenly distributed between the low and high categories.

Table 4. Distribution of appetitive traits by aebq dimension (n = 303)

Appetitive trait	Low, f (%)	High, f (%)	Cut off
Enjoyment of food	100 (33.0)	203 (67.0)	11
Emotional overeating	232 (76.6)	71 (23.4)	14
Emotional undereating	118 (38.9)	185 (61.1)	14
Food fussiness	118 (38.9)	185 (61.1)	14
Food responsiveness	159 (52.5)	144 (47.5)	13
Slowness in eating	131 (43.2)	172 (56.8)	12
Hunger	152 (50.2)	151 (49.8)	12
Satiety responsiveness	119 (39.3)	184 (60.7)	12

Associations of Nutrition Knowledge and Food Choice Motives with Eating Behavior

Table 5 presents the bivariate associations between the two independent variables and eating behavior. Balanced nutrition knowledge was not significantly associated with eating behavior (p = .393). Among students with low nutrition knowledge, 56.6% were classified as having poor eating behavior, compared with 51.6% of those with good knowledge. The odds of poor eating behavior were higher in the low-knowledge group, although the association was not statistically significant (OR = 1.23; 95% CI: 0.77–1.96).

In contrast, food choice motives were significantly associated with eating behavior (p = .003). Poor eating behavior was observed in 63.2% of students with low food choice motive scores, compared with 45.9% of those with high scores. Students in the low-motive category had approximately twice the prevalence odds of being classified as having poor eating behavior (OR = 2.02; 95% CI: 1.27–3.22).

Table 5. Bivariate associations of nutrition knowledge and food choice motives with eating behavior (n = 303)

Variable	Poor eating behavior, f (%)	Good eating behavior, f (%)	Total	p-value	OR (95% CI)
Balanced nutrition knowledge					
Low	64 (56.6)	49 (43.4)	113	0.393	1.23 (0.77–1.96)
Good (reference)	98 (51.6)	92 (48.4)	190		1
Food choice motives					
Low	84 (63.2)	49 (36.8)	133	0.003	2.02 (1.27–3.22)
High (reference)	78 (45.9)	92 (54.1)	170		1

Note. OR = odds ratio; CI = confidence interval. Pearson's chi-square test was used, with statistical significance defined as $p < 0.05$.

Discussion

Principal Findings

This study examined the associations of balanced nutrition knowledge and food choice motives with eating behavior and described appetitive traits among public health students at Universitas Cenderawasih. Although most participants were classified as having good nutrition knowledge (62.7%) and high food choice motives (56.1%), more than half (53.5%) were categorized as having poor eating behavior. Food choice motives were significantly associated with eating behavior, whereas nutrition knowledge was not. These findings add to the literature examining discrepancies between nutrition knowledge and eating practices among university students and young adults (Benson, 2022; Issa et al., 2025; Kinsey & Ormsbee, 2015; Muzlan et al., 2026).

Balanced Nutrition Knowledge and Eating Behavior

The absence of a statistically significant association between balanced nutrition knowledge and eating behavior suggests that knowledge, as measured in this study, may not adequately distinguish students with different eating behavior classifications. Students with low nutrition knowledge had slightly higher odds of poor eating behavior than those with good knowledge, but the confidence interval included the null value (OR = 1.23; 95% CI: 0.77–1.96).

Previous research has discussed discrepancies between nutrition knowledge, dietary intentions, and actual eating practices among university students (Carrillo-González, 2025; Evangelin Pua & Sarah Renyoet, 2022; Kusuma et al., 2025; Li et al., 2022; Suryani & Ariani, 2025; R. Wahyuningtyas et al., 2021; J. Zhang & Man, 2025). Food-related decisions may involve competing considerations, including affordability, convenience, sensory preferences, and food availability, which are not necessarily captured by knowledge assessments (Falconet et al., 2025; Li et al., 2022; Whatnall et al., 2020; Almoraie et al., 2025). These considerations provide possible explanations for inconsistencies between knowledge and eating practices, although the present study did not directly evaluate their relative contributions.

Additional descriptive findings showed that many participants reported irregular meal patterns, breakfast skipping, and changes in eating habits after entering university. However, the cross-sectional design and retrospective self-reporting prevent conclusions about whether university enrollment itself contributed to these changes. Moreover, the nonsignificant association should not be interpreted as evidence that nutrition knowledge is unimportant. The findings indicate only that the measured knowledge categories were not significantly associated with the study's eating behavior classification.

Food Choice Motives and Eating Behavior

Food choice motives were significantly associated with eating behavior. Students with low food choice motive scores had approximately twice the prevalence odds of being classified as having poor eating behavior compared with students with high scores (OR = 2.02; 95% CI: 1.27–3.22). This finding suggests that the overall food choice motive score may be relevant to differences in eating behavior within the study population.

Previous research has examined the relevance of food-related motivations to dietary decisions, including considerations of health, sensory characteristics, and personal preferences (Albardan & Platat, 2025; Daly et al., 2023; Falconet et al., 2025; Hanifah, 2025; Sahadeo et al., 2025; Schulp et al., 2024; Silva et al., 2023; Williams, 2023; Yıldırım & Demir Başaran, 2025). In the present study, weight control (72.3%), natural content (71.9%), and health (69.6%) had the largest proportions of participants in their respective high-score categories. These findings indicate that these considerations were frequently reported among participants, although the category-specific percentages do not establish their relative importance on a common measurement scale.

The association between overall food choice motives and eating behavior provides a rationale for considering motivational factors in campus nutrition promotion. However, the significant association for the composite score does not establish which individual motive dimensions were associated with eating behavior. Furthermore, although the reported odds ratio for food choice motives was larger than that for nutrition knowledge, separate bivariate analyses do not establish that one association was statistically stronger than the other. Multivariable analyses would be needed to examine whether the observed association remained after accounting for potential confounding factors.

Appetitive Traits and Eating Behavior

The descriptive analysis identified variation across the eight appetitive traits. Enjoyment of food was classified as high in 67.0% of participants, whereas emotional overeating was high in 23.4%. Among food-avoidance traits, emotional undereating, food fussiness, satiety responsiveness, and slowness in eating were frequently classified in the high category. These findings illustrate variation in self-reported appetitive characteristics within the study population.

Previous studies have examined associations between appetitive traits, eating-related tendencies, and anthropometric outcomes (Dalrymple et al., 2020; He et al., 2021; Hunot-Alexander et al., 2019; Salas-García et al., 2024; Hunots et al., 2019; Williams, 2023). Appetitive traits provide a complementary perspective

because they describe responses to food-related cues, hunger, satiety, and emotional states rather than dietary knowledge alone.

Nevertheless, the present study assessed appetitive traits descriptively and did not examine their associations with BMI, food choice motives, or nutrition knowledge. Therefore, the findings cannot establish whether particular traits were protective against unhealthy eating or contributed to the observed differences in eating behavior. In addition, the high and low classifications were based on sample-derived cutoffs, which should not be interpreted as established clinical or behavioral thresholds.

Sociocultural and Food Environment Considerations in Papua

The findings should also be considered within the broader food-system context of Papua. Previous literature has described the importance of locally sourced foods, including sago, tubers, fish, and other traditional food resources, within Papuan dietary practices (Ade, 2022; Flach et al., 2021; Nurhasan et al., 2022). Other studies have discussed changes in traditional food systems, land use, and access to locally available foods in parts of Papua and West Papua (Chao, 2022; Kustanto et al., 2024; Rumbewas et al., 2022; Wambi et al., 2022).

Such regional developments provide a relevant context for considering how food availability, affordability, and cultural preferences might relate to students' dietary choices. However, the present study did not directly assess participants' traditional food consumption, cultural food preferences, household food security, or campus food environments. Consequently, the observed associations cannot be attributed to specific sociocultural or environmental changes.

The relatively high proportion of students classified as having high food fussiness should also be interpreted cautiously. Without detailed dietary histories or information about participants' food environments, it is not possible to determine whether this trait reflected familiarity with particular foods, sensory preferences, or other characteristics. Future qualitative and dietary studies could investigate these possibilities.

Study Strengths and Limitations

This study examined cognitive, motivational, and appetitive dimensions among 303 public health students in Eastern Indonesia, using instruments with high reported internal consistency. However, its cross-sectional, single-faculty design and predominantly female sample limit causal inference and generalizability. Self-reported measures were susceptible to recall and social desirability biases, while the absence of dietary intake assessments restricted conclusions about dietary quality. Mean-based dichotomization may have reduced information, and classifying eating behavior using a composite Adult Eating Behavior Questionnaire score requires further psychometric validation. Unadjusted bivariate analyses also leave potential confounding unresolved.

Implications and Future Research

These findings support considering food choice motives alongside nutrition education in campus health promotion, without establishing intervention effectiveness. Future longitudinal and intervention studies should investigate temporal relationships and evaluate strategies addressing specific food choice motives. Validated dietary assessments and multivariable analyses would strengthen outcome measurement and control for potential confounding. Qualitative and comparative research should examine campus food environments, affordability, traditional diets, psychosocial factors, and food marketing, particularly in Eastern Indonesia

Conclusion

Among public health students at Universitas Cenderawasih, food choice motives were significantly associated with eating behavior, whereas balanced nutrition knowledge was not. Despite relatively high nutrition knowledge, more than half of the students were classified as having poor eating behavior.

These findings suggest that campus nutrition promotion programs should consider food choice motivations alongside nutrition education. Future studies incorporating longitudinal designs, validated dietary assessments, and contextual factors are needed to clarify these associations and inform targeted nutrition interventions.

Declaration of Conflict of Interest

The authors declare that there are no conflicts of interest regarding the conduct of this study,

preparation of the manuscript, or its publication. This research was carried out independently and without any influence from institutions or external parties.

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