

Associations of Habitual Garlic Consumption with Perceived Health and Quality of Life among Thai Participants

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ABSTRACT

Background: Garlic (*Allium sativum* L.) is widely used in Thai cooking and has a long history as a traditional health-promoting food. Most previous studies have focused on garlic supplements or specific clinical outcomes. Less is known about how regular garlic consumption relates to perceived health and quality of life in everyday settings.

Methods: We conducted a cross-sectional study of 107 Thai participants aged 13 to 71 years. Participants completed the Garlic Consumption and Holistic Health Questionnaire (GCHHQ), which assessed habitual garlic consumption, a 14-item multidimensional perceived-health scale, and four additional items concerning self-reported adverse effects. We evaluated the reliability of the health scale and examined associations between garlic consumption and self-reported health outcomes.

Results: Most participants consumed garlic regularly, mainly in cooked meals. Many reported consuming garlic for more than one year. The 14-item health scale showed excellent internal consistency, with Cronbach's $\alpha = 0.964$ and McDonald's $\omega = 0.964$. The mean multidimensional health score was 3.13 ± 0.84 . Participants reported generally favorable health perceptions and few adverse effects related to garlic intake. Garlic consumption frequency showed a weak positive correlation with perceived physical health. In multivariable analysis, physical health showed the strongest relationship with quality of life. Garlic consumption itself did not emerge as a strong independent predictor of overall well-being.

Conclusion: Regular garlic consumption was associated with generally positive perceptions of health among this Thai sample. However, the findings do not support garlic intake as an independent determinant of quality of life. Garlic may instead form part of a broader dietary and lifestyle pattern linked with better perceived health. These results should be interpreted with caution because the study used self-reported data, convenience sampling, and a cross-sectional design. Larger longitudinal studies should combine detailed dietary assessment with objective health measures to clarify the role of habitual garlic intake in long-term health.

Keywords: Garlic; Dietary habits; Perceived health; Quality of life; Thailand

INTRODUCTION

Garlic (*Allium sativum* L.) has been an integral part of human diets for centuries and is widely recognized for its culinary, medicinal, and nutritional value. Beyond its characteristic flavor, garlic contains numerous bioactive organosulfur compounds, including allicin, diallyl sulfides, and S-allyl cysteine, which have been reported to possess antioxidant, anti-inflammatory, antimicrobial, immunomodulatory, and cardioprotective properties.

Owing to these biological activities, garlic has attracted considerable scientific interest and is now regarded as one of the most extensively studied functional foods.

A substantial body of research has demonstrated beneficial effects of garlic supplementation on cardiovascular risk factors, blood pressure, lipid metabolism, glucose homeostasis, and immune function. Most of these investigations, however, have been conducted under controlled experimental conditions using garlic extracts, aged garlic preparations, or concentrated supplements. Consequently, existing evidence primarily reflects pharmacological or therapeutic effects and offers limited insight into the health implications of consuming garlic as part of normal dietary practice.

From a public health perspective, foods are rarely consumed in isolation, and their potential benefits should be interpreted within the context of overall dietary behaviors and lifestyle. Lifestyle medicine increasingly recognizes that health extends beyond the prevention of individual diseases and encompasses multiple interrelated dimensions, including physical functioning, digestive health, psychological well-being, vitality, sleep, and quality of life. These domains interact continuously and collectively shape an individual's perception of health and well-being.

Although nutritional epidemiology has advanced considerably over recent decades, much of the literature continues to focus on individual nutrients or specific disease outcomes. Comparatively fewer studies have examined how a commonly consumed food relates to overall health in everyday settings. Because garlic is routinely incorporated into daily meals across many cultures rather than consumed solely as a nutritional supplement, it provides an appropriate model for investigating habitual dietary behavior within a broader health framework.

Thailand represents a particularly suitable setting for such research. Garlic is widely used in Thai cuisine and forms part of the regular diet of people across different age groups and socioeconomic backgrounds. Despite its widespread consumption, little is known about whether differences in habitual garlic intake are associated with perceived health in the general Thai population. To date, few studies have simultaneously examined garlic consumption together with physical health, digestive health, mental well-being, vitality, sleep quality, health satisfaction, and quality of life within a single multidimensional framework.

To address this gap, the present study explored the association between habitual garlic consumption and multidimensional health among Thai participants using the newly developed Garlic Consumption and Holistic Health Questionnaire (GCHHQ). Rather than evaluating garlic as a therapeutic intervention, this research considered garlic consumption as one component of everyday dietary behavior and examined its relationship with multiple dimensions of health under real-world conditions. By integrating dietary habits with a holistic assessment of well-being, the study seeks to contribute new evidence to nutritional epidemiology and lifestyle medicine while providing a broader understanding of how routine food choices may relate to overall health.

Research Hypothesis

It was hypothesized that individuals reporting more frequent, greater, and longer-term garlic consumption would demonstrate more favorable multidimensional health outcomes, including better physical health, digestive health, mental well-being, vitality, sleep quality, health satisfaction, and overall quality of life.

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional survey was conducted between May and June 2026 to examine the relationship between habitual garlic consumption and multidimensional health among Thai residents. The study was developed within the framework of lifestyle medicine, which considers long-term dietary behaviors to be important contributors to overall health and well-being. Rather than evaluating garlic as a therapeutic agent or nutritional supplement, the investigation focused on naturally occurring garlic consumption as part of everyday dietary practice. The

primary objective was to explore whether habitual garlic intake was associated with physical health, digestive health, mental well-being, vitality, sleep quality, health satisfaction, and overall quality of life.

Participants

Participants were recruited throughout Thailand using convenience sampling. Invitations to participate were distributed through educational institutions, community organizations, and social media platforms.

Individuals were eligible if they were Thai residents aged 13 years or older, were able to read and understand Thai, and voluntarily provided electronic informed consent before completing the questionnaire. For participants younger than 18 years, informed consent was obtained from a parent or legal guardian in accordance with institutional ethical requirements.

Responses were excluded if questionnaires were incomplete, contained inconsistent or implausible answers, or if informed consent was not provided. After data screening, 107 completed questionnaires were retained for statistical analysis. Participants ranged in age from 13 to 71 years and represented adolescents, adults, and older adults.

Sample Size Estimation

The required sample size was estimated using **G*Power version 3.1** for multiple linear regression.

The calculation assumed:

- effect size (f^2) = 0.15
- significance level (α) = 0.05
- statistical power = 0.80
- six predictor variables

Under these assumptions, a minimum sample of 98 participants was required. The final sample of 107 participants exceeded this requirement, providing adequate statistical power for the planned multivariable analyses.

Development of the Garlic Consumption and Holistic Health Questionnaire (GCHHQ)

Data were collected using the Garlic Consumption and Holistic Health Questionnaire (GCHHQ), a self-administered questionnaire developed specifically for the present study.

Questionnaire development followed a structured process. First, an extensive review of the literature was conducted to identify key concepts related to habitual garlic consumption, functional foods, lifestyle medicine, health-related quality of life, and holistic health. Candidate items were then generated to reflect both garlic consumption behaviors and perceived health outcomes. The preliminary questionnaire was reviewed by an expert panel before being finalized for data collection.

The final questionnaire consisted of seven domains:

1. demographic characteristics;
2. habitual garlic consumption;
3. physical health;
4. digestive health;

5. mental well-being;
6. vitality and sleep; and
7. health satisfaction and quality of life.

Habitual garlic consumption was assessed by four indicators: consumption frequency, usual daily amount, duration of habitual intake, and the most common preparation method (e.g., raw, cooked, pickled, or black garlic).

Perceived health outcomes were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated more favorable perceived health.

Content Validity and Reliability

Content validity was evaluated independently by three experts with experience in nutrition, public health, and epidemiology. Each questionnaire item was assessed for clarity, relevance, and consistency with the study objectives using the Item–Objective Congruence (IOC) method. IOC values ranged from 0.80 to 1.00, indicating satisfactory content validity.

Prior to the main survey, the questionnaire underwent pilot testing to ensure readability and comprehensibility. Minor wording revisions were made based on participant feedback before final administration.

Internal consistency was evaluated using both Cronbach's alpha (α) and McDonald's omega (ω), with coefficients of 0.70 or higher considered acceptable. The multidimensional health scale demonstrated excellent reliability, with Cronbach's $\alpha = 0.964$ and McDonald's $\omega = 0.964$, indicating a high degree of internal consistency among questionnaire items.

Study Variables

The principal exposure variable was habitual garlic consumption, characterized by consumption frequency, average daily amount, duration of intake, and preparation method.

The primary outcome was multidimensional health, comprising seven interconnected domains:

- physical health;
- digestive health;
- mental well-being;
- vitality;
- sleep quality;
- health satisfaction; and
- quality of life.

An overall Holistic Health Score was calculated by averaging the multidimensional health items. Higher scores represented better perceived overall health.

Potential confounding variables included age, sex, educational level, and the presence of chronic disease. These variables were included as covariates in multivariable regression analyses.

Statistical Analysis

Statistical analyses were performed using SPSS Statistics. Continuous variables are presented as mean $\pm$ standard deviation (SD), whereas categorical variables are summarized using frequencies and percentages.

The internal consistency of the GCHHQ was assessed using Cronbach's alpha and McDonald's omega. Relationships among multidimensional health domains were examined using Pearson's correlation coefficients.

To identify factors independently associated with multidimensional health, multiple linear regression analyses were performed. Separate regression models were constructed for physical health, digestive health, and quality of life. Independent variables included garlic consumption frequency, daily intake, duration of consumption, age, sex, educational level, and chronic disease status, where appropriate.

Model assumptions were evaluated before interpretation. Linearity and homoscedasticity were examined through residual plots, normality of residuals was assessed using standardized residual distributions, multicollinearity was evaluated using tolerance and variance inflation factor (VIF) statistics, and independence of residuals was assessed using the Durbin–Watson statistic. A two-sided p value < 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Electronic informed consent was obtained from all participants before questionnaire completion. Participation was voluntary, anonymous, and confidential, and participants were free to withdraw at any stage without consequence.

The study protocol was reviewed and approved by the CADET-TUTOR SCHOOL Institutional Review Board (Approval No. 06001/2026).

Conceptual Framework

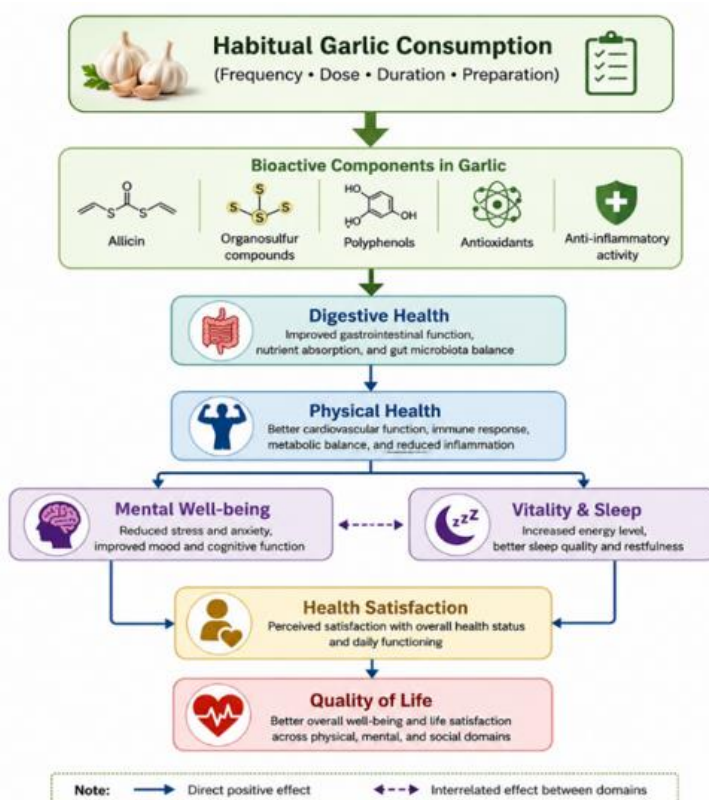


Figure 1. Conceptual framework of the relationship between habitual garlic consumption and quality of life.

RESULTS

Participant Characteristics

The characteristics of the study participants are presented in **Table 1**. A total of 107 individuals completed the survey and were included in the analysis. Female participants accounted for 76.6% ($n = 82$) of the sample, whereas 23.4% ($n = 25$) were male. Participants ranged in age from 13 to 71 years, with a mean age of 40.79 ± 12.43 years.

Regarding educational attainment, most participants had completed a bachelor's degree (70.1%), followed by postgraduate education (15.0%) and secondary education (14.0%). Overall, 29 participants (27.1%) reported having at least one chronic disease. Hypertension was the most commonly reported condition (16.8%), followed by dyslipidemia (9.3%), allergy (3.7%), and diabetes mellitus (2.8%). Additional demographic characteristics are summarized in **Table 1**.

Table 1. Sociodemographic characteristics of participants ($N = 107$)

Characteristic	n (%) / Value
Sex	
Female	82 (76.6)
Male	25 (23.4)
Age, years	
Mean $\pm$ SD	40.79 ± 12.43
Median	44.00
Range	13–71
Educational level	
Below secondary education	1 (0.9)
Secondary education	15 (14.0)
Bachelor's degree	75 (70.1)
Postgraduate degree	16 (15.0)
Chronic disease status	
No chronic disease	78 (72.9)
At least one chronic disease	29 (27.1)
Reported chronic diseases¹	
Hypertension	18 (16.8)
Dyslipidemia	10 (9.3)

Allergy	4 (3.7)
Diabetes mellitus	3 (2.8)
Thyroid disease	2 (1.9)
Gout	1 (0.9)
Asthma	1 (0.9)
Heart disease	1 (0.9)
Gastroesophageal reflux disease	1 (0.9)
Kidney disease	1 (0.9)
Arteriovenous malformation	1 (0.9)

Note. Data are presented as *n* (%) unless otherwise indicated. SD = standard deviation. ¹Participants could report more than one chronic disease; therefore, disease-specific percentages do not sum to 27.1% or 100%.

Habitual Garlic Consumption Patterns

Habitual garlic consumption was common among participants.

The most frequently reported consumption pattern was 1–2 days per week (39.3%), followed by 3–4 days per week (29.0%).

Most participants consumed 1–2 cloves per day, while more than half had maintained garlic consumption for longer than one year, suggesting that garlic intake represented a stable dietary behavior rather than a short-term intervention.

Cooked garlic was the predominant preparation method.

These findings indicate that garlic consumption in this population primarily reflected everyday eating habits rather than medicinal supplementation.

Table 2. Habitual garlic consumption characteristics of participants (N = 107)

Characteristic	n (%)
Frequency of garlic consumption	
Never	6 (5.6)
1–2 days/week	42 (39.3)
3–4 days/week	31 (29.0)
5–6 days/week	12 (11.2)
Daily	16 (15.0)
Preparation or form of consumption	

Cooked garlic only	74 (69.2)
Raw garlic only	8 (7.5)
Raw and cooked garlic	18 (16.8)
Raw, cooked, and pickled garlic	3 (2.8)
Black garlic only	1 (0.9)
Garlic supplement only	1 (0.9)
Cooked garlic and garlic supplement	2 (1.9)
Average amount consumed per day	
<1 clove/day	25 (23.4)
1–2 cloves/day	40 (37.4)
3–4 cloves/day	26 (24.3)
>4 cloves/day	16 (15.0)
Duration of garlic consumption	
<1 month	18 (16.8)
1–3 months	10 (9.3)
4–6 months	5 (4.7)
7–12 months	3 (2.8)
>1 year	71 (66.4)

Note. Data are presented as *n* (%). Percentages may not total exactly 100% because of rounding. Preparation categories represent the exact combinations selected by participants in the questionnaire.

Among the 107 participants, the most common frequency of garlic consumption was 1–2 days per week (39.3%), followed by 3–4 days per week (29.0%) and daily consumption (15.0%). Six participants (5.6%) reported never consuming garlic. Cooked garlic was the predominant preparation method, with 69.2% consuming cooked garlic exclusively and a further 16.8% consuming both raw and cooked garlic. The most commonly reported daily intake was 1–2 cloves (37.4%), followed by 3–4 cloves (24.3%) and less than one clove (23.4%). Most participants reported consuming garlic for more than one year (66.4%), indicating that long-term garlic consumption was common in the study population.

Psychometric Evaluation of the Garlic Consumption and Holistic Health Questionnaire (GCHHQ)

Expert evaluation demonstrated satisfactory content validity, with Item–Objective Congruence (IOC) values ranging from 0.80 to 1.00, indicating that all questionnaire items were considered relevant to the intended constructs.

The multidimensional health scale also demonstrated excellent internal consistency. Cronbach's alpha was 0.964, while McDonald's omega was likewise 0.964, both substantially exceeding the recommended threshold of 0.70.

These findings indicate a high level of consistency among questionnaire items and support the reliability of the GCHHQ for assessing multidimensional health outcomes in relation to habitual garlic consumption.

Holistic Health Profile

The distribution of multidimensional health scores is presented in Table 4 and illustrated in Figure 2. Overall, participants reported relatively favorable multidimensional health outcomes, with a mean Holistic Health Score of 3.13 ± 0.84 on the five-point Likert scale.

Among the evaluated domains, the highest mean scores were observed for the perceived suitability of long-term garlic consumption, followed by overall quality of life, health satisfaction, and overall physical health. In contrast, items related to adverse effects, including allergic reactions and heartburn, received the lowest mean scores, indicating that these symptoms were infrequently reported by participants. Complete descriptive statistics for each domain are provided in Table 4.

Table 3. Descriptive Statistics of Holistic Health and Perceived Adverse Effects among Habitual Garlic Consumers (n = 107)

Domain	Item	Mean $\pm$ SD
Physical Health	Physical health improved	3.24 ± 1.03
	Increased energy	3.06 ± 0.98
	Reduced illness	3.06 ± 1.04
	Cardiovascular health improved	3.22 ± 1.04
	Better weight control	2.98 ± 1.02
Digestive Health	Improved digestion	3.14 ± 0.96
	Reduced abdominal bloating	3.12 ± 1.05
Mental Well-being	Better concentration	2.99 ± 0.94
	Reduced stress	2.99 ± 1.01
Vitality and Sleep	Feeling more refreshed	3.09 ± 1.05
	Improved sleep quality	3.01 ± 1.00
Health Satisfaction	Satisfaction with personal health	3.24 ± 1.01
Quality of Life	Overall quality of life improved	3.32 ± 1.02
Long-term Acceptability	Suitable for long-term garlic consumption	3.39 ± 1.14
Perceived Adverse Effects	Heartburn	1.78 ± 1.06
	Abdominal discomfort	1.94 ± 1.08
	Garlic-related bad breath	3.23 ± 1.38
	Allergic reactions	1.62 ± 0.95

Participants generally reported favorable perceptions of their multidimensional health. The highest mean score was observed for the perceived suitability of long-term garlic consumption (3.39 ± 1.14), followed by overall quality of life (3.32 ± 1.02), satisfaction with personal health (3.24 ± 1.01), and improved physical health (3.24 ± 1.03). Moderate positive perceptions were also observed for digestive health, vitality, and cardiovascular health. In contrast, perceived adverse effects were generally infrequent, with allergic reactions (1.62 ± 0.95) and heartburn (1.78 ± 1.06) receiving the lowest scores. Garlic-related bad breath was the most commonly reported adverse effect (3.23 ± 1.38). The overall Holistic Health Score across the 14 positive health indicators was 3.13, indicating generally favorable perceived health among habitual garlic consumers.

Correlation Analysis

Pearson correlation analysis demonstrated positive relationships among several dimensions of holistic health.

Physical health showed moderate-to-strong positive correlations with vitality, sleep quality, and quality of life, suggesting that these domains were closely interconnected.

Digestive health also correlated positively with physical health, although the magnitude of association was smaller.

These findings support the conceptual framework that multidimensional health domains interact rather than function independently.

Table 4. Domain Scores of Holistic Health among Habitual Garlic Consumers (n = 107)

Domain	Number of Items	Mean $\pm$ SD
Physical Health	5	3.11 $\pm$ 0.88
Digestive Health	2	3.13 $\pm$ 0.92
Mental Well-being	2	2.99 $\pm$ 0.92
Vitality and Sleep	2	3.05 $\pm$ 0.96
Health Satisfaction	1	3.24 $\pm$ 1.01
Quality of Life	1	3.32 $\pm$ 1.02
Long-term Acceptability	1	3.39 $\pm$ 1.14
Perceived Adverse Effects*	4	2.14 $\pm$ 0.81

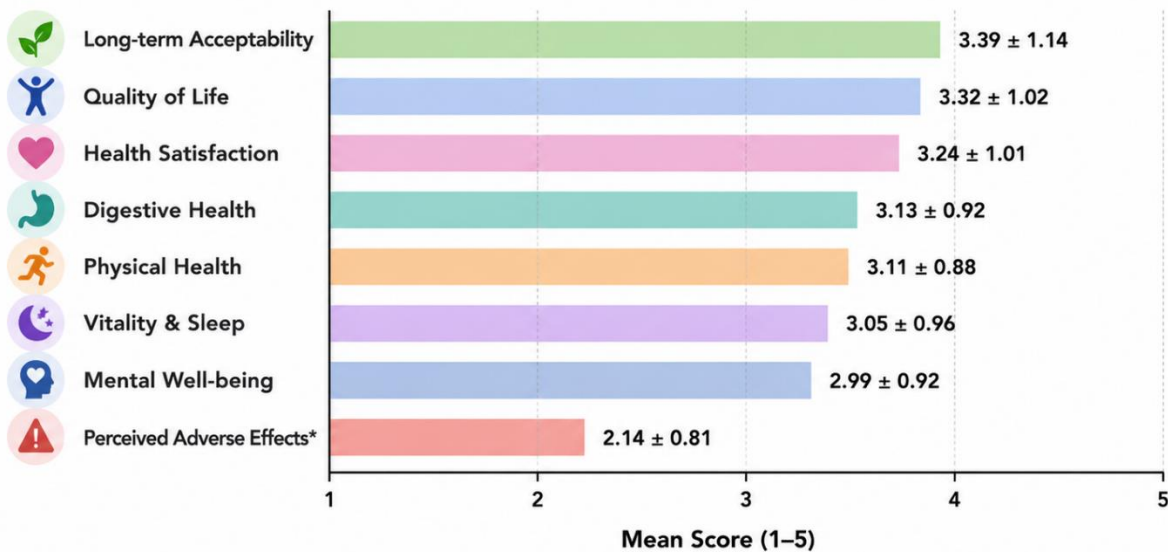
Domain Scores of Holistic Health

To facilitate interpretation of multidimensional health, individual questionnaire items were aggregated into seven conceptual domains representing holistic health. Among the positive health domains, Long-term Acceptability demonstrated the highest mean score (3.39 ± 1.14), followed by Quality of Life (3.32 ± 1.02) and Health Satisfaction (3.24 ± 1.01). Digestive Health (3.13 ± 0.92), Physical Health (3.11 ± 0.88), and Vitality and Sleep (3.05 ± 0.96) also showed favorable mean scores above the scale midpoint. Mental Well-being had the lowest mean score among the positive domains (2.99 ± 0.92). The Perceived Adverse Effects domain yielded a relatively low mean score (2.14 ± 0.81), suggesting that adverse symptoms associated with habitual garlic consumption were generally infrequent.

Figure 2 Mean Domain Scores of Holistic Health

FIGURE 2. Mean Domain Scores of Perceived Health and Self-Reported Adverse Effects among Study Participants (N = 107)

Mean scores on a 5-point Likert scale



Overall Perceived Health Index (mean of 14 positive health items): 3.13 ± 0.84

Note. Scores range from 1 to 5. Higher scores indicate better perceived health, except for adverse effects, where higher scores indicate more frequently perceived symptoms.

Table 5. Pearson Correlation Matrix among Habitual Garlic Consumption and Holistic Health Domains

Variable	1	2	3	4	5	6	7	8
1. Frequency	1.000							
2. Dose	0.466	1.000						
3. Duration	0.457	0.335	1.000					
4. Physical Health	0.260	0.370	0.200	1.000				
5. Digestive Health	0.248	0.316	0.269	0.835	1.000			
6. Mental Well-being	0.182	0.274	0.201	0.831	0.727	1.000		
7. Vitality & Sleep	0.227	0.312	0.211	0.855	0.751	0.933	1.000	
8. Quality of Life	0.238	0.323	0.219	0.796	0.655	0.776	0.824	1.000

Pearson correlation analysis demonstrated that habitual garlic consumption variables were positively associated with multidimensional health outcomes, although these associations were generally weak to moderate ($r = 0.18-0.37$). Among the health domains, strong positive correlations were observed between Physical Health and Vitality & Sleep ($r = 0.855$), Physical Health and Digestive Health ($r = 0.835$), and Vitality & Sleep and Quality of Life ($r = 0.824$). These findings support the multidimensional nature of holistic health and indicate that improvements in one health domain are closely associated with improvements in others.

Figure 3 Correlation Network

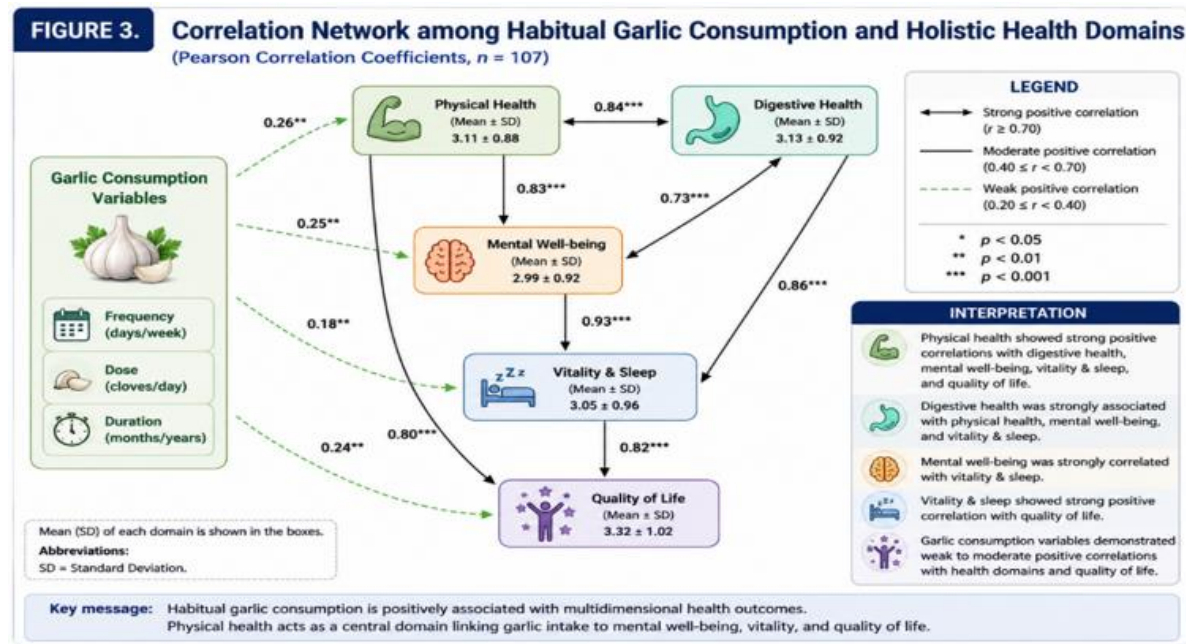
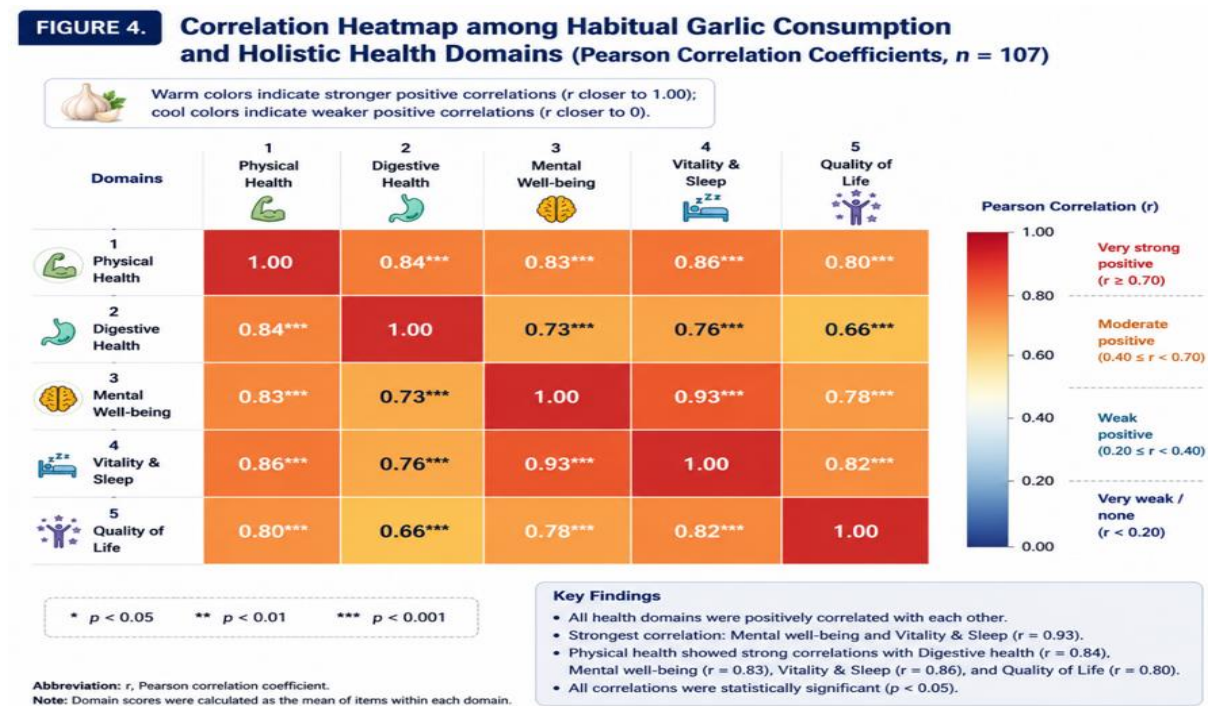


Figure 4 Correlation Heatmap



Multiple Linear Regression

Table 6. Multiple Linear Regression Analysis Predicting Quality of Life ($n = 107$)

Predictor	B	SE	Standardized β	t	p-value
Constant	0.445	0.232	—	1.92	0.057
Physical Health	0.947	0.126	0.76	7.50	<0.001
Digestive Health	-0.041	0.121	-0.03	-0.34	0.735

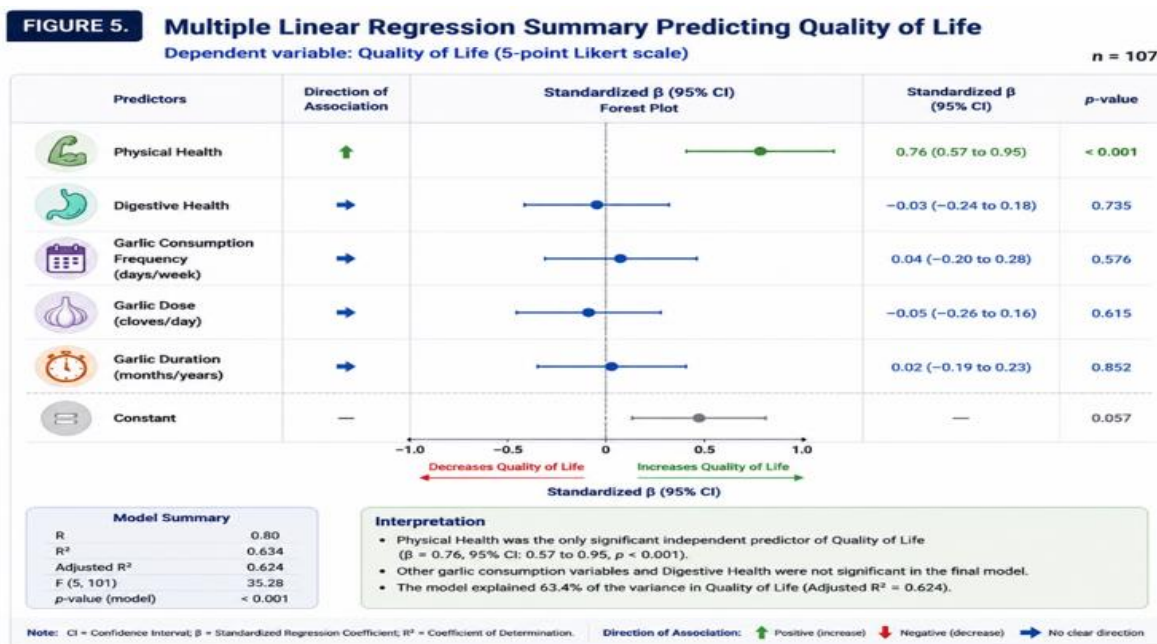
Garlic Consumption Frequency	0.017	0.030	0.04	0.56	0.576
Garlic Dose (cloves/day)	-0.021	0.042	-0.05	-0.51	0.615
Garlic Duration (months/years)	0.009	0.046	0.02	0.19	0.852

Model statistics

- $R = 0.80$ $R^2 = 0.634$ Adjusted $R^2 = 0.624$
- $F = 35.28$ $p < 0.001$

Multiple linear regression analysis was performed including Physical Health, Digestive Health, Garlic Consumption Frequency, Garlic Dose, and Garlic Duration as predictors of Quality of Life. Physical Health was the only significant independent predictor ($\beta = 0.76$, $p < 0.001$). Digestive Health and all garlic consumption variables (frequency, dose, and duration) were not independently associated with Quality of Life after adjustment. The final model explained 63.4% of the variance in Quality of Life ($R^2 = 0.634$; Adjusted $R^2 = 0.624$).

Figure 5 Multiple Linear Regression Summary



DISCUSSION

This study examined the relationship between habitual garlic consumption, perceived health, and quality of life among Thai participants. Garlic intake showed weak positive associations with several health domains. The strongest relationships appeared among the health domains themselves, especially physical health, digestive health, mental well-being, vitality, sleep, and quality of life.

The regression results provide a clearer picture. Physical health was the only significant predictor of quality of life ($\beta = 0.76$, $p < 0.001$). Garlic consumption frequency, dose, and duration were not significant independent predictors. These findings do not support a direct effect of garlic intake on quality of life. Garlic consumption likely occurs alongside other dietary and lifestyle behaviors, which were not fully measured in this study.

Most participants consumed garlic as part of regular meals, mainly cooked garlic, and 66.4% reported consumption for more than one year. Only a small number reported supplement use. This pattern differs from

many previous garlic studies based on concentrated extracts or supplements. The present results therefore describe habitual dietary intake rather than therapeutic garlic use.

The GCHHQ showed satisfactory content validity and high internal consistency, with Cronbach's α and McDonald's ω both equal to 0.964. Further psychometric testing is still needed. The cross-sectional design, convenience sampling, self-reported outcomes, and limited control of dietary and lifestyle factors also restrict interpretation. Future studies should use larger representative samples, validated health measures, objective clinical indicators, and longitudinal follow-up to assess whether habitual garlic intake has an independent relationship with health outcomes.

CONCLUSION

This cross-sectional study found weak positive associations between habitual garlic consumption and selected dimensions of perceived health among Thai participants. Physical health showed the strongest relationship with quality of life. Garlic consumption frequency, dose, and duration were not independent predictors of quality of life in the multivariable analysis. These results describe observational associations and do not establish a causal health benefit from garlic consumption.

The study focused mainly on garlic consumed as part of everyday meals rather than as a supplement. The GCHHQ showed satisfactory content validity and high internal consistency, with Cronbach's α and McDonald's ω both equal to 0.964. Further psychometric testing is still needed before the questionnaire is considered fully validated.

Future research should use larger and more representative samples, validated health and quality-of-life measures, detailed assessment of dietary and lifestyle factors, and objective clinical indicators. Longitudinal studies and dietary intervention trials are needed to determine whether habitual garlic consumption has an independent relationship with health outcomes.

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Author Contributions

J.Y. contributed to the conceptualization of the study, questionnaire development, data collection, formal statistical analysis, data curation, preparation of tables, and drafting of the original manuscript. N.A. contributed to questionnaire development, data collection, statistical analysis, preparation of tables, and drafting of the manuscript. P.K. contributed to data collection, data analysis, data curation, and preparation of tables. P.E. conceived and supervised the study, designed the research methodology, provided academic guidance throughout the project, critically reviewed and revised the manuscript, validated the findings, managed the journal submission process, and served as the corresponding author. All authors have read and approved the final version of the manuscript.

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Institutional Review Board Statement

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and was approved by the Institutional Review Board (IRB) of CADET-TUTOR SCHOOL (Approval No. 06001/2026).

Informed Consent Statement

Electronic informed consent was obtained from all participants prior to completion of the questionnaire. Participation was voluntary, anonymous, and participants could withdraw at any time without consequence.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

Abbreviation

Abbreviation	Definition
GCHHQ	Garlic Consumption and Holistic Health Questionnaire
QoL	Quality of Life
SD	Standard Deviation
CI	Confidence Interval
OR	Odds Ratio
IRB	Institutional Review Board
WHO	World Health Organization

REFERENCES

1. Ankri, S., & Mirelman, D. (1999). Antimicrobial properties of allicin from garlic. *Microbes and Infection*, 1(2), 125–129. [https://doi.org/10.1016/S1286-4579\(99\)80003-3](https://doi.org/10.1016/S1286-4579(99)80003-3)
2. Bahadoran, Z., Mirmiran, P., Momenan, A., & Azizi, F. (2017). Allium vegetable intakes and the incidence of cardiovascular disease, hypertension, chronic kidney disease, and type 2 diabetes in adults: a longitudinal follow-up study. *Journal of Hypertension*, 35(9), 1909–1916. <https://doi.org/10.1097/HJH.0000000000001356>
3. Banerjee, S. K., & Maulik, S. K. (2002). Effect of garlic on cardiovascular disorders: A review. *Nutrition Journal*, 1, Article 4. <https://doi.org/10.1186/1475-2891-1-4>
4. Bayan, L., Koulivand, P. H., & Gorji, A. (2014). Garlic: A review of potential therapeutic effects. *Avicenna Journal of Phytomedicine*, 4(1), 1–14. <https://doi.org/10.22038/AJP.2014.2393>
5. Borrelli, F., Capasso, R., & Izzo, A. A. (2007). Garlic (*Allium sativum* L.): Adverse effects and drug interactions in humans. *Molecular Nutrition & Food Research*, 51(11), 1386–1397. <https://doi.org/10.1002/mnfr.200700072>
6. Borlinghaus, J., Albrecht, F., Gruhlke, M. C. H., Nwachukwu, I. D., & Slusarenko, A. J. (2014). Allicin: Chemistry and biological properties. *Molecules*, 19(8), 12591–12618. <https://doi.org/10.3390/molecules190812591>
7. Chan, J. Y., Yuen, A. C., Chan, R. Y., & Chan, S. W. (2013). A review of the cardiovascular benefits and antioxidant properties of aged garlic extract. *Journal of Traditional and Complementary Medicine*, 3(1), 39–45. <https://doi.org/10.4103/2225-4110.106535>
8. Deng, Y., Ho, C.-T., Lan, Y., et al. (2023). Bioavailability, health benefits, and delivery systems of allicin: A review. *Journal of Agricultural and Food Chemistry*, 71, 16805–16828. <https://doi.org/10.1021/acs.jafc.3c05602>

9. In: Kumar, P., Singh, P., Diwakar, M., Garg, D. (eds) Healthcare Industry Assessment: Analyzing Risks, Security, and Reliability. Engineering Cyber-Physical Systems and Critical Infrastructures, vol 11. Springer, Cham. https://doi.org/10.1007/978-3-031-65434-3_11
10. Ekvitayavetchanukul, P., & Ekvitayavetchanukul, P. (2025). AI-Driven Design Thinking: Transforming Learning Efficiency in Pre-Medical Education. Medical Research Archives, 13(4). <https://doi.org/10.18103/mra.v13i4.6410>
11. Ekvitayavetchanukul, P., Chuerdee, A., Promsupsin, A., Kraikittiwut, R., Kraikittiwut, R., & Ekvitayavetchanukul, P. (2024). Behavioral use of Andrographis paniculata and its efficacy in treating COVID-19 among regular herb users in Thailand. International Journal of Medical Research, 3(4), 1–10. <https://doi.org/10.61705/3wer0p03>
12. Fejes, R., Bondonno, C. P., Radavelli-Bagatini, S., Kühn, T., & Wagner, K.-H. (2024). Exploring the health benefits of raw white garlic consumption in humans: A mini review. Frontiers in Nutrition, 11, 1459627. <https://doi.org/10.3389/fnut.2024.1459627>
13. Iciek, M., Kwiecień, I., & Włodek, L. (2009). Biological properties of garlic and garlic-derived organosulfur compounds. Environmental and Molecular Mutagenesis, 50(3), 247–265. <https://doi.org/10.1002/em.20474>
14. Kaschula, C. H., et al. (2010). The chemistry and biological activity of organosulfur compounds from garlic. Natural Product Reports, 27(3), 363–385. <https://doi.org/10.1039/B914148A>
15. Karnjanapratum, S., Supapvanich, S., Kaewthong, P., & Takeungwongtrakul, S. (2021). Impact of steaming pretreatment process on characteristics and antioxidant activities of black garlic (*Allium sativum* L.). Journal of Food Science and Technology, 58(5), 1869–1876. <https://doi.org/10.1007/s13197-020-04698-7>
16. Lanzotti, V. (2006). The analysis of onion and garlic. Journal of Chromatography A, 1112(1–2), 3–22. <https://doi.org/10.1016/j.chroma.2005.12.016>
17. Lawson, L. D., & Gardner, C. D. (2005). Composition, stability, and bioavailability of garlic products. Journal of Nutrition, 135(3 Suppl.), 800S–804S. <https://doi.org/10.1093/jn/135.3.800S>
18. Lawson, L. D., & Hunsaker, S. M. (2018). Allicin bioavailability and bioequivalence from garlic supplements and foods. Nutrients, 10(7), 812. <https://doi.org/10.3390/nu10070812>
19. Mathasuriyapong, P., Korcharlermsonthi, N., Ekvitayavetchanukul, P., & Ekvitayavetchanukul, P. (2025). Modeling the health burden of PM2.5: Forecasting hospital admissions and medical demand in Bangkok and neighboring regions. Journal of Posthumanism, 5(6), 862–873. <https://doi.org/10.63332/joph.v5i6.2155>
20. Martins, N., Petropoulos, S., & Ferreira, I. C. F. R. (2016). Chemical composition and bioactive compounds of garlic. Food and Chemical Toxicology, 93, 1–15. <https://doi.org/10.1016/j.fct.2016.04.016>
21. Pakakaew, P., Taesuwan, S., Phimolsiripol, Y., & Utama-ang, N. (2021). Comparison between the physicochemical properties, bioactive compounds and antioxidant activities of Thai and Chinese garlicks. Current Applied Science and Technology, 22(3). <https://doi.org/10.55003/cast.2022.03.22.006>
22. Percival, S. S. (2016). Aged garlic extract modifies human immunity. Journal of Nutrition, 146(2), 433S–436S. <https://doi.org/10.3945/jn.114.202192>
23. Rahman, K. (2001). Historical perspective on garlic and cardiovascular disease. Journal of Nutrition, 131(3), 977S–979S. <https://doi.org/10.1093/jn/131.3.977S>
24. Rahman, K. (2007). Effects of garlic on platelet biochemistry and physiology. Molecular Nutrition & Food Research, 51(11), 1335–1344. <https://doi.org/10.1002/mnfr.200700082>
25. Rivlin, R. S. (2001). Historical perspective on the use of garlic. Journal of Nutrition, 131(3 Suppl.), 951S–954S. <https://doi.org/10.1093/jn/131.3.951S>
26. Ried, K. (2016). Garlic lowers blood pressure in hypertensive individuals: An updated meta-analysis. Journal of Nutrition, 146(2), 389S–396S. <https://doi.org/10.3945/jn.114.202192>
27. Ried, K., Fakler, P., & Stocks, N. P. (2013). Effect of garlic on blood pressure: A systematic review and meta-analysis. BMC Cardiovascular Disorders, 13, 1. <https://doi.org/10.1186/1471-2261-13-1>
28. Shang, A., Cao, S.-Y., Xu, X.-Y., et al. (2019). Bioactive compounds and biological functions of garlic. Foods, 8(7), 246. <https://doi.org/10.3390/foods8070246>
29. Sommano, S., Saratan, N., Suksathan, R., & Pusadee, T. (2016). Chemical composition and comparison of genetic variation of commonly available Thai garlic used as food supplement. Journal of Applied Botany and Food Quality, 89, 235–242. <https://doi.org/10.5073/JABFQ.2016.089.030>

30. Steiner, M., Li, W., & Lin, R. I. (1996). Aged garlic extract: A modulator of cardiovascular risk factors. *Journal of Nutrition*, 126(4 Suppl.), 1030S–1034S. https://doi.org/10.1093/jn/126.suppl_4.1030S
31. Sutabutra, T., Rujachan, P., Manasakorn, K., Sripetchnai, M., & Ekvitayavetchanukul, P. (2025). The impact of design thinking vs rote learning on secondary student achievement: An experimental study in Bangkok schools. *Asian Journal of Education and Social Studies*, 51(2), 411–422. <https://doi.org/10.9734/ajess/2025/v51i21794>
32. Tai, X., Luo, T., Song, K., Zhao, H., Chen, S., Li, H., Liu, M., Dai, J., Qian, X., & Du, M. (2025). Dietary pattern of garlic and risk of chronic diseases: Evidence from three large-scale cohorts. *Health Care Science*, 4(4), 269–280. DOI: 10.1002/hcs2.70030
33. Thammasri, W., et al. (2026). Effect of storage conditions on the stability of physical and chemical characteristics of Thai garlic. *Journal of Science and Technology Mahasarakham University*, 45(1), 19–25. <https://doi.org/10.14456/jscitech.2026.3>
34. Tsai, C.-W., Chen, H.-W., Sheen, L.-Y., & Lii, C.-K. (2012). Garlic: Health benefits and actions. *BioMedicine*, 2(1), 17–29. <https://doi.org/10.1016/j.biomed.2011.12.002>
35. Wang, H.-C., Pao, J., Lin, S.-Y., & Sheen, L.-Y. (2012). Molecular mechanisms of garlic-derived organosulfur compounds. *Journal of Agricultural and Food Chemistry*, 60(18), 4879–4887. <https://doi.org/10.1021/jf3007305>
36. Wan, X., Li, Z., et al. (2019). Allium vegetable consumption and health: An umbrella review of meta-analyses of multiple health outcomes. *Food Science & Nutrition*, 7(8), 2451–2470. <https://doi.org/10.1002/fsn3.1117>
37. White, D. (2021). Healthy uses for garlic. *Nursing Clinics of North America*, 56(1), 153–156. <https://doi.org/10.1016/j.cnur.2020.12.001>
38. Xu, H., Li, X., Adams, H., Kubena, K., & Guo, S. (2020). Etiology of metabolic syndrome and dietary interventions including garlic. *Nutrients*, 12(3), 1–22. <https://doi.org/10.3390/nu12030736>
39. Yaxiao Wang, Jiaoyang Li, Li Li, Shengxin Quan, Ge Meng, Yeqing Gu, Qing Zhang, Li Liu, Hongmei Wu, Sizhen Lai, Yinxiao Chen, Tongfeng Liu, Shaomei Sun, Xing Wang, Qiyu Jia, Kun Song, Kaijun Niu; The association between raw garlic consumption and the risk of depressive symptoms: the TCLSIH cohort study. *Food Funct.* 2024; 15 (8): 4436–4445. <https://doi.org/10.1039/d3fo03833e>
40. Zeng, T., Guo, F. F., Zhang, C. L., et al. (2017). A meta-analysis of randomized controlled trials on garlic and blood lipids. *Nutrition Research Reviews*, 30(2), 267–282. <https://doi.org/10.1017/S0954422417000067>