Knowledge, Usage and Perceived Side Effects of Monosodium Glutamate (MSG) among Catering Student at UTHM

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Abstract

Monosodium glutamate (MSG) is a common flavor enhancer, yet perceptions of its safety remain mixed. This study assessed catering students' knowledge, usage, and perceived side effects of MSG at Universiti Tun Hussein Onn Malaysia (UTHM). A descriptive, cross-sectional survey was administered to 92 students using a structured questionnaire covering demographics, MSG knowledge, usage patterns, and perceived side effects; descriptive statistics (frequency, percentage, mean, standard deviation) were computed in SPSS version 26.0. Overall, respondents demonstrated a moderate level of knowledge about MSG and a moderate level of usage, while perceived side effects were rated high on average, indicating persistent concerns about adverse effects despite moderate understanding and use. These findings suggest the need for targeted education on evidence-based safety thresholds, labeling literacy, and best-practice application of flavor enhancers in culinary settings. Future research should compare cohorts (e.g., by year of study or exposure to food science coursework) and incorporate inferential analyses to examine associations among knowledge, usage, and perceived side effects.

1. Introduction

Monosodium glutamate (MSG), the sodium salt of L-glutamic acid, is widely used to enhance umami and improve the overall palatability of foods, often enabling partial sodium reduction without compromising consumer acceptance (Abdou, 2025). Despite decades of culinary use and regulatory evaluations, public perceptions of MSG remain mixed due to historical narratives in example, Chinese Restaurant Syndrome, variable media coverage, and inconsistencies in scientific literacy (Crowe-White, 2023). Systematic investigations and blinded challenge studies have generally failed to reproduce consistent adverse reactions in the general population, with any reported sensitivity appearing limited to a small subset of individuals under specific conditions in example large bolus doses without food, (Leidy, 2024). Major scientific and regulatory bodies conclude that MSG is safe for the general population when used in typical dietary amounts, assigning it an Acceptable Daily Intake (ADI) not specified and reaffirming safety under normal culinary use (Geha et al., 2020). For culinary and hospitality students that will be the future decision-makers in menu development, procurement, and front-of-house communication has accurate knowledge about MSG's function, safe-use parameters, labeling, and its role in flavor optimization and sodium management is essential to ensure evidence-based practice and consistent, transparent messaging to consumers (FDA, 2021).

1.1 Research Background

Monosodium glutamate (MSG) is a flavor enhancer that has been widely used in the culinary world since its introduction in the early 20th century. Derived from the amino acid L-glutamic acid, MSG imparts the umami taste, which is often described as savory or meaty, enhancing the overall flavor profile of various dishes (Abdou, 2025). This compound is particularly prevalent in Asian cuisines but has found its way into processed foods globally, contributing to a wide range of culinary applications.

In cooking, the use of food seasonings, including MSG, plays a critical role in developing the complex flavor of meals. Seasonings such as herbs, spices, and salts contribute to distinct tastes and aromas, elevating the sensory experience of food. MSG is valued for its ability to amplify flavors without introducing additional sodium, making it a popular choice among chefs seeking to reduce salt content while maintaining palatability (Crowe-White, 2023). The combination of MSG with other seasonings can create a balanced flavor profile, allowing for more nuanced and satisfying dishes.

Despite its popularity, MSG has been the subject of considerable debate regarding its safety and health effects. Initial public concerns arose in the late 1960s with the term "Chinese Restaurant Syndrome," which suggested that MSG consumption could lead to adverse reactions, including headaches and nausea (Crowe-White, 2023). These claims prompted numerous scientific investigations aimed at understanding the potential health implications of MSG consumption.

Recent systematic reviews and studies have largely concluded that MSG is safe for the general population when consumed in typical dietary amounts. Regulatory bodies, including the FDA and the European Food Safety Authority (EFSA), have affirmed MSG's safety, indicating that it does not pose a significant health risk (Geha et al., 2020) However, some individuals may exhibit mild sensitivity to MSG, particularly when consumed in large quantities or without food (Leidy, 2024).

The culinary and hospitality sectors are increasingly recognizing the importance of flavor enhancers like MSG in sodium reduction strategies. As public health initiatives focus on lowering sodium intake to combat hypertension and cardiovascular diseases, MSG offers a way to maintain flavor while potentially reducing overall sodium content in foods (FDA, 2021).

Given the mixed perceptions surrounding MSG, it is essential for culinary and hospitality students, as future professionals in menu development and food communication, to possess accurate knowledge about MSG's function, safety profile, and regulatory status. This understanding will enable them to make informed decisions about ingredients and effectively communicate with consumers, ensuring transparency and fostering trust in food choices.

1.2 Problem Statement

Despite the widespread use of monosodium glutamate (MSG) as a flavor enhancer in culinary practices globally, public perception of its safety and health effects remains contentious. Historical associations with adverse reactions, particularly the concept of "Chinese Restaurant Syndrome," have led to skepticism and concern among consumers regarding MSG consumption. This skepticism persists even as scientific research has largely established MSG as safe for the general population when consumed in typical dietary amounts.

Moreover, as culinary professionals increasingly seek to enhance flavors while minimizing sodium intake in response to public health initiatives, the role of MSG in achieving this balance is critical. However, a lack of comprehensive understanding and effective communication about MSG's function, safety profile, and potential benefits in flavor optimization poses challenges for culinary educators and hospitality professionals.

This research aims to investigate the current knowledge and perceptions surrounding MSG among culinary students and professionals, assess the implications of these perceptions on culinary practices, and explore the potential of MSG as a tool for sodium reduction in food preparation. By addressing these issues, the study seeks to contribute to evidence-based practices in culinary education and promote informed decision-making regarding the use of flavor enhancers in food.

1.3 Research Objectives

The main objective of this study is to find out the perception of catering students at UTHM towards the use of monosodium glutamate (MSG) in cooking. There are three objectives in this study. The following are the objectives of the study:
1. To determine the level of catering students' knowledge about MSG.
2. To determine the frequency of MSG use in cooking among catering students.
3. To determine the perceived side effects of MSG reported by catering students.

2. Methodology

This study was conducted among catering students in UTHM and applied a Knowledge–Attitudes/Perceptions–Practices (KAP) framework to examine students' knowledge about monosodium glutamate (MSG), their perceptions including perceived side effects and their self-reported use of MSG in cooking. Data were collected using a brief, structured questionnaire administered either in paper form during class sessions or online via a secure survey platform which completion time was approximately 8–10 minutes.

The instrument comprised three sections, knowledge, attitude and practices (usage of MSG). Demographics and potential covariates were recorded. The instrument was developed from relevant literature and course materials, reviewed by 23 subject-matter experts for content validity, and piloted with 30 students to refine wording and estimate reliability. Data were cleaned and scored per protocol, with missing responses handled via listwise deletion for scale scores or limited mean imputation when item-level missingness was ≤10%. Analyses included descriptive statistics (means, standard deviations, frequencies, and item-level percentages), bivariate correlations among K, A, and P, and simple regressions to examine A as a function of K and P as a function of K and A. Group differences by training characteristics were explored using t-tests or ANOVA.

2.1 Research Design

The study employed a quantitative, cross-sectional survey design grounded in the KAP framework to assess levels of knowledge, perceptions, and practices regarding MSG at a single point in time and to examine their interrelationships (World Health Organization [WHO], 2020). The conceptual model specified a primary pathway from knowledge to attitudes/perceptions to practice, with additional direct paths from knowledge to practice and from attitudes to practice capturing potential partial mediation (Hayes, 2022). A cross-sectional approach was selected for feasibility and efficiency within an academic term, enabling program-level situational assessment and timely identification of educational needs. While this design did not establish causality and was subject to self-report and potential non-response bias, these limitations were mitigated through anonymous data collection, neutral and balanced item wording, in-class administration or structured online deployment to enhance response rates, and a pilot test to improve clarity and reliability (DeVellis & Thorpe, 2021).

2.2 Research Sample & Population

The population of the study involved all catering students at UTHM. This group was chosen because these students were closely engaged in the field of cooking and were potential educators in catering who required accurate knowledge about the use of MSG in cooking. The target population comprised 120 UTHM catering students listed on official enrollment records. Simple random sampling was employed to ensure that every student in this population had an equal chance of selection as a study respondent. From the population of 120, a final sample of 92 students was obtained, which provided adequate precision for descriptive estimates and sufficient power for regression models with a small number of predictors (rule-of-thumb 15–20 participants per predictor). Inclusion criteria were current enrollment in UTHM catering programs and availability during the data-collection period (or access to institutional email for online administration), while exclusions included non-catering majors, students on leave, and individuals who did not provide consent. Recruitment was coordinated with program heads to schedule brief survey sessions at the end of classes or to distribute secure online links, accompanied by an information sheet and consent form emphasizing anonymity, voluntariness, and the absence of any link to grades or academic standing.

2.3 Research Instrument

This study used a structured questionnaire aligned with a survey methodology. The instrument comprised four sections: Part A, Part B, Part C, and Part D. Part A captured respondent demographics (e.g., age, sex, year of study, prior food safety coursework, and internship experience). Part B assessed knowledge of monosodium glutamate (MSG) using factual items. Part C measured students' perceptions of MSG use in cooking, and Part D focused on perceived side effects associated with MSG in cooking. Parts C and D used a five-point Likert scale to capture the intensity of agreement with each statement (e.g., 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree; see Table 1). The Likert format facilitated efficient responding and streamlined analysis by enabling summary indices and reliability estimation. Where applicable, positively worded items were reverse coded so that higher scores represented more negative perceptions or greater concern about side effects, ensuring consistent interpretation across items.

Table 1 *Likert scale*

Scale	Element
1	Strongly disagree
2	Disagree
3	Less Agree
4	Agree
5	Strongly Agree

3. Result and Discussion

Data analysis was aligned with the three stated objectives. To determine the level of catering students' knowledge about monosodium glutamate, each knowledge item was scored as one point for a correct answer and zero points for an incorrect or "do not know" answer, then the points were summed to create a total knowledge score; the distribution of scores was described using the mean, the standard deviation, the median, and the interquartile range, and scores were categorized into low, moderate, and high knowledge using pre-specified cut points, with internal consistency evaluated using the Kuder–Richardson Formula 20 and item characteristics summarized for difficulty and discrimination. To determine the frequency of monosodium glutamate use in cooking, self-reported usage was analyzed with descriptive statistics matched to the item format: for an ordinal frequency scale from never to always, medians, interquartile ranges, and response proportions were presented and, where useful, responses were grouped into categories such as never or rarely versus sometimes or often or always to estimate prevalence; for a count-based measure such as times per week, means, standard deviations, and percentiles were reported, with outliers inspected and, if needed, minorized to limit the influence of extreme values. To determine perceived side effects of monosodium glutamate, Likert scale items were reverse coded where necessary and averaged to produce a side effects perception score, with reliability assessed using Cronbach's alpha; in addition, the prevalence of specific side effect beliefs or experiences, when measured as individual items or checklists, was summarized using frequencies and percentages. Where appropriate, brief subgroup summaries by sex or by year of study were provided descriptively to give context for each objective's findings.

3.1 Data Analysis

The data analysis included several steps. For knowledge about monosodium glutamate, each question was scored as one point for a correct answer and zero points for an incorrect or "do not know" answer, the points were summed into a total knowledge score, the distribution of scores was described using the mean, the standard deviation, the median, and the interquartile range, the scores were classified into low, moderate, and high using predefined cut points, internal consistency was assessed with the Kuder–Richardson Formula 20, and item difficulty and item discrimination were summarized. For the frequency of monosodium glutamate use in cooking, ordinal responses ranging from never to always were summarized with medians, interquartile ranges, and response proportions, and categories were grouped to estimate prevalence; for count data such as times per week, means, standard deviations, and percentiles were reported, outliers were checked. For perceived side effects, items were reverse coded when necessary and averaged to create a side effects perception score, reliability was assessed with Cronbach's alpha, and specific beliefs or experiences were summarized with frequencies and percentages.

3.1.1 Demographic Respondent Analysis

A total of 92 respondents consisting of male and female catering student at UTHM have answered the questionnaire that has been distributed through the google form. There are four question items in part A which are the respondent's demographics consisting of gender, age, and nation. Table 3 below shows the findings of the descriptive analysis using frequency (f) and percentage values for the respondents' demographic items. The result from the demographic section shows below in Table 2.

Table 2 *Descriptive analysis of respondent demographics*

Information	Frequency (f)	Percentage (%)
Gender		
Men	29	31.5
Female	63	68.5
Age		
19-22 Years	12	13.0
22-24 Years	77	83.7
25-27 Years	3	3.3
Nation		
Malay	79	85.9
Chinese	0	0.0
India	1	1.1
Others	12	13.0

3.1.2 Analysis of the Knowledge Analysis of Monosodium Glutamate (MSG)

Data analysis for this first research question involves eight items that have been answered by 92 respondents through the questionnaire that has been distributed. Descriptive analysis of the first objective of this study has also been shown in table 3 which uses the mean score and standard deviation.

Table 3 *Analysis of the Knowledge of Monosodium Glutamate (MSG) in cooking*

No.	Questions	Mean Score	Standard Deviation	Inter Performance
B1	Do you know what MSG is?	4.17	0.60	
B2	Is MSG a flavor enhancer in cooking?	4.40	0.76	Height
B3	Did you know that MSG consists of water, sodium and glutamate?	2.77	0.58	Height
B4	Did you know MSG is made naturally from sugarcane, corn and cassava?	2.92	0.60	Intermediate
B5	Are you aware of the existence of food products that contain MSG?	4.07	0.78	Intermediate
B6	Did you know the sodium content in MSG is lower than the sodium content in salt?	2.78	0.61	Height
B7	Did you know Ajinomoto is the main favorite brand of MSG users?	3.76	1.09	Intermediate
B8	Did you know that the internet is a resource for information about MSG?	4.51	0.50	Height
	Average	3.67	0.28	Intermediate

Overall knowledge was at an intermediate level, with an average item mean of 3.67 and an average standard deviation of 0.28. Knowledge was strongest for foundational and practical items. Most respondents knew that the internet is a resource for information about monosodium glutamate, with a mean of 4.51 and a standard deviation of 0.50, and that monosodium glutamate is a flavor enhancer in cooking, with a mean of 4.40 and a standard deviation of 0.76. A large majority also recognized what monosodium glutamate is, with a mean of 4.17 and a standard deviation of 0.60, and were aware that food products contain monosodium glutamate, with a mean of 4.07 and a standard deviation of 0.78. Familiarity with brands was somewhat lower but still in the intermediate range, as shown by the item on Ajinomoto as a favorite brand among users, with a mean of 3.76 and a standard deviation of 1.09.

Knowledge gaps were evident for more technical or specific content areas. Understanding that monosodium glutamate consists of water, sodium, and glutamate had a mean of 2.77 and a standard deviation of 0.58. Awareness that the sodium content of monosodium glutamate is lower than that of table salt had a mean of 2.78

and a standard deviation of 0.61. Recognition that monosodium glutamate is produced naturally from sources such as sugarcane, corn, and cassava had a mean of 2.92 and a standard deviation of 0.60.

Taken together, the pattern indicates high familiarity with basic role and access to information about monosodium glutamate, intermediate recognition of brand and product presence, and lower knowledge on composition, production sources, and relative sodium content.

3.1.3 Analysis of the Usage of Monosodium Glutamate (MSG) in Cooking

Based on table 4, it shows the analysis of each item in the students' perception in the use of Monosodium Glutamate (MSG) in cooking at UTHM. Overall attitudes toward MSG were mixed but leaned moderately positively. On average, respondents scored 3.67 (SD = 0.66), which is "Intermediate." Many agreed that MSG improves taste (C4 = 4.13) and can help reduce salt in cooking (C5 = 3.84), and they felt confident identifying dishes that contain MSG (C6 = 3.78). They also believed Malay cuisine uses more MSG than Western cuisine (C10 = 3.88) and that dishes like thick gravy (dalca) tend to use more MSG (C8 = 3.71). At the same time, there were notable concerns: people worried about side effects (C3 = 3.97) and felt they should avoid foods with MSG (C7 = 4.15). Views were more neutral on not mixing MSG in cooking (C1 = 3.47), satisfaction when using MSG (C9 = 3.53), the idea that cooking isn't good without MSG (C11 = 3.46), and that MSG helps food last longer (C12 = 3.25). The lowest agreement was that MSG provides nutrients (C2 = 2.80). In short, respondents recognize MSG's taste benefits and possible salt reduction but still have safety concerns and some hesitation about regular use.

Table 4 *Analysis of the use of Monosodium Glutamate (MSG) in cooking*

No.	Question	Mean Score	Standard Deviation	Inter Performance
C1	I don't think MSG should be mixed in cooking.	3.47	1.21	Intermediate
C2	I think this MSG provides nutrients in cooking.	2.80	1.19	Intermediate
C3	I am concerned about the side effects of MSG in cooking.	3.97	1.06	Height
C4	I know that with the use of MSG, it can improve the taste in cooking.	4.13	0.88	Height
C5	I can reduce the amount of salt in cooking when using MSG.	3.84	1.14	Height
C6	I can identify dishes that contain MSG or not.	3.78	0.97	Height
C7	I know that I need to avoid eating foods that contain MSG.	4.15	0.96	Height
C8	I know dishes with thick gravy like dalca use more MSG.	3.71	1.00	Height
C9	I am satisfied when using MSG in cooking.	3.53	1.19	Intermediate
C10	I know malay cuisine uses more MSG than western cuisine.	3.88	1.04	Height
C11	I think my cooking is not good if I don't use MSG.	3.46	1.25	Intermediate
C12	I think dishes made using MSG can be stored longer.	3.25	1.25	Intermediate
	Average	3.67	0.66	Intermediate

3.1.4 Analysis of Side Effect of Monosodium Glutamate (MSG) in Cooking

Based on table 5, it shows the analysis of each item in the students' perception in the use of Monosodium Glutamate (MSG) in cooking at UTHM. Overall, respondents expressed strong concern about adverse health effects from MSG, with an average agreement of 3.73 (SD = 0.74), categorized as High. The highest concern areas were that MSG causes hair loss (D5 = 4.10) and can damage the nervous system when consumed in excess (D10 = 4.03), alongside elevated worries about dehydration or excessive thirst (D6 = 3.83), high blood pressure (D7 = 3.84), and learning disabilities in children (D8 = 3.87). Moderate concerns included headaches (D1 = 3.64), insomnia (D2 = 3.57), effects on skin diseases such as psoriasis (D3 = 3.63), lethargy (D4 = 3.45), and chest pain when consuming a lot of MSG (D9 = 3.29). Taken together, these ratings indicate a predominantly risk-oriented perception of MSG across a wide range of symptoms and conditions, with moderate variability across respondents.

Table 5 *Analysis of the use of Monosodium Glutamate (MSG) in cooking*

No.	Question	Mean Score	Standard Deviation	Inter Performance
D1	I will easily get a headache if I eat food that contains MSG	3.64	Simple	Intermediate
D2	I know these foods containing MSG cause insomnia	3.57	Simple	Intermediate
D3	MSG can affect skin diseases such as psoriasis	3.63	Simple	Intermediate
D4	My body is easily lethargic if I eat food that contains MSG	3.45	Simple	Intermediate
D5	Hair loss is one of the effects of using MSG	4.10	Height	Height
D6	MSG makes me easily dehydrated like thirsty if I overdo it in cooking.	3.83	Height	Height
D7	MSG can cause high blood pressure values.	3.84	Height	Height
D8	I know MSG will give children learning disabilities	3.87	Height	Height
D9	I get chest pain if I eat food that has a lot of MSG.	3.29	Simple	Intermediate
D10	I know foods that have too much MSG can cause damage to the nervous system.	4.03	Height	Height
	Average	3.73	0.74	Height

3.2 Discussion

3.2.1 Objective 1: Knowledge Analysis of Monosodium Glutamate (MSG)

The results of the study found that the overall, respondents demonstrated a moderate level of knowledge about MSG (M = 3.67, SD = 0.28). Awareness was strongest for general recognition and information access: most knew MSG is a flavor enhancer (B2, M = 4.40) and that the internet is a key source of MSG information (B8, M = 4.51), alongside awareness of MSG-containing products (B5, M = 4.07) and common brands (B7, M = 3.76). However, important conceptual gaps persist. Knowledge was notably lower regarding MSG's composition (that MSG consists of water, sodium, and glutamate; B3, M = 2.77), its typical production from carbohydrate sources such as sugarcane, corn, and cassava (B4, M = 2.92), and its relatively lower sodium content compared to table salt (B6, M = 2.78). These patterns suggest that while students are familiar with MSG as a culinary enhancer, foundational understanding of its chemistry and nutritional profile is less robust. Compared to prior work reporting generally low knowledge (Saraswati, 2012), the present findings indicate an improvement to a moderate level. Persistent misconceptions may be shaped by long-standing public narratives such as the "Chinese restaurant syndrome," despite systematic reviews finding limited evidence linking MSG to headache in controlled conditions (Obayashi

& Nagamura, 2016; see also Peterson et al., 2020 for historical context). Strengthening instruction on what MSG is, how it is produced and metabolized, and how it differs from sodium chloride could close these gaps. Framing MSG within the broader landscape of food additives (Carocho et al., 2014) and clarifying evidence around sodium and health (World Health Organization, 2019) may also help students integrate accurate concepts. Finally, high brand recognition (e.g., Ajinomoto) likely reflects market prominence and marketing visibility (Nora, 2017), reinforcing the importance of complementing commercial exposure with evidence-based educational materials.

3.2.2 Objective 2: The Usage of Monosodium Glutamate (MSG) in Cooking

Findings indicate a moderate overall level of MSG use/perception among students (M = 3.67, SD = 0.66). The pattern reflects a nuanced, somewhat ambivalent stance: students acknowledge functional benefits of MSG—especially its ability to improve taste (C4, M = 4.13) and enable salt reduction (C5, M = 3.84)—and many feel capable of identifying dishes containing MSG (C6, M = 3.78). At the same time, caution is prominent. Concern about side effects is high (C3, M = 3.97), and the highest-scoring item indicates a perceived need to avoid foods with MSG (C7, M = 4.15), suggesting precautionary behavior that coexists with recognition of culinary advantages. Views about contextual use are evident: students believe thick gravies like dalca use more MSG (C8, M = 3.71) and that Malay cuisine uses more MSG than Western cuisine (C10, M = 3.88), pointing to culturally situated expectations of usage. Importantly, respondents do not generally regard MSG as nutritionally beneficial (C2, M = 2.80), and satisfaction with using MSG is only moderate (C9, M = 3.53), reinforcing the picture of guarded adoption rather than wholehearted endorsement.

This ambivalence aligns with broader nutrition guidance that encourages sodium reduction while acknowledging the role of flavor optimization to maintain acceptability. Authoritative dietary guidance emphasizes lowering sodium intake for population health, which can be supported by culinary strategies such as using umami-rich ingredients (including glutamate sources) to maintain palatability when reducing added salt (Dietary Guidelines for Americans, 2020–2025; WHO, 2023). Within that context, MSG can be a practical flavor tool because it contributes umami without adding as much sodium as an equivalent amount of table salt, potentially enabling reformulation and recipe adjustments that keep perceived saltiness and overall liking comparable at lower sodium levels. Regulatory and public health communications also continue to affirm MSG's status as safe for the general population when used within good manufacturing practice, while recognizing that perceptions of adverse effects persist among some consumers (FDA, 2022).

Given the observed heterogeneity in attitudes (e.g., larger SDs for C1, C2, C11, C12), targeted education may help students translate evidence into practice: differentiating culinary function from nutritional value; applying evidence-based sodium-reduction techniques (e.g., partial salt replacement with umami contributors, label reading, and sensory-aware recipe reformulation); and situating MSG use within culturally authentic cooking while meeting health objectives. Such training is consistent with current public-health priorities on sodium reduction and could help move students from cautious, inconsistent use toward informed, moderate, and purposeful application.

3.2.3 Objective 3: Side Effects of Monosodium Glutamate (MSG) in Cooking

Students at UTHM reported predominantly risk-oriented perceptions of MSG, with high agreement that MSG can cause hair loss and damage the nervous system, and notable concern about dehydration/thirst, high blood pressure, and learning disabilities in children. While such concerns mirror long-standing public narratives about "MSG side effects," they only partially align with current scientific consensus. Regulatory and expert reviews conclude that MSG is generally safe at typical dietary intakes; the FDA classifies MSG as GRAS and notes that reports of transient symptoms ("MSG symptom complex," e.g., headache, flushing) occur mainly in sensitive individuals and often under atypical conditions such as large bolus doses on an empty stomach (FDA 2022). EFSA's comprehensive re-evaluation set a group ADI of 30 mg/kg bw/day (as glutamic acid) and did not substantiate claims of neurotoxicity or broad adverse effects at normal exposure, though it recommended reducing maximum permitted use levels because high intakes in some scenarios could approach or exceed the ADI (EFSA 2017). Concerns about hypertension should also be interpreted through the lens of total sodium exposure: MSG contains substantially less sodium by weight than table salt and can, in some formulations, help lower overall sodium without compromising palatability (WHO 2023; Jinap & Hajeb 2010). By contrast, claims such as hair loss and learning disabilities in children are not supported by authoritative evaluations (EFSA 2017; FDA 2022). Collectively, the gap between students' high concern ratings and the weight of evidence suggests targeted education is warranted—clarifying the difference between rare, short-lived sensitivity versus established safety at customary intakes, situating blood pressure risk within overall sodium management, and demonstrating culinary strategies where umami (including MSG) supports flavor with moderated sodium. Such efforts may recalibrate perceptions from precautionary avoidance toward informed, context-appropriate use.

4. Conclusion

This study shows that UTHM students hold a cautious, ambivalent view of MSG: they recognize its culinary benefits, especially boosting taste and enabling partial salt substitution and express high concern about potential side effects. Overall perceptions were moderate (M = 3.67, SD = 0.66), with strong acknowledgment of taste enhancement (C4, M = 4.13) and perceived ability to identify MSG in dishes (C6, M = 3.78), alongside agreement that MSG can support salt reduction (C5, M = 3.84). At the same time, precautionary attitudes were pronounced, with a perceived need to avoid MSG scoring highest (C7, M = 4.15) and specific side-effect concerns rated high (e.g., hair loss and nervous system damage; overall side-effects domain M = 3.73, SD = 0.74). Cultural expectations shaped perceptions of usage (higher in thick gravies and Malay cuisine), and satisfaction with MSG remained only moderate, indicating guarded adoption rather than endorsement. The relatively wide variability across several items suggests heterogeneous prior experiences and information sources.

Taken together, the findings point to salient evidence–perception gap. Authoritative reviews conclude that MSG is generally safe at customary dietary exposures, with rare, transient sensitivity reported mainly under atypical dosing conditions; moreover, MSG can support sodium-reduction strategies because it contains substantially less sodium than table salt and enhances palatability when some NaCl is replaced (EFSA 2017; FDA 2022; WHO 2023; Jinap & Hajeb 2010). The persistence of high concern, especially for effects not supported by regulatory consensus which highlights the need for targeted education that differentiates culinary function from nutritional value, clarifies safety and dose context, and demonstrates practical sodium-reduction techniques using umami.

Practical implications include integrating brief, evidence-based modules on umami and sodium reduction into culinary and nutrition courses, hands-on training in label reading and recipe reformulation; and collaborations with campus food services to pilot lower-sodium, umami-forward menu items. Such efforts can preserve flavor while moderating sodium intake and may recalibrate attitudes from precautionary avoidance to informed, context-appropriate use.

Limitations include the cross-sectional, self-report design at a single university, which may limit causal inference and generalizability; social desirability and recall biases are also possible. Future research should test education and recipe interventions experimentally, track longitudinal attitude shifts, incorporate objective intake measures where feasible, and examine subgroup differences in culinary training, prior nutrition education, cultural background to tailor messaging more precisely.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** *Afif Naim;* **data collection:** *Nur Anis Intan Aqiah;* **analysis and interpretation of results:** *Afif Naim and Nur Anis Intan Aqiah;* **draft manuscript preparation:** *Afif Naim. All authors reviewed the results and approved the final version of the manuscript.*

References

Abdel-Moemin, A. R., Regenstein, J. M., & AbdelRahman, M. K. (2018). New Food Products for Sensory-Compromised Situations. Comprehensive Reviews in Food Science and Food Safety, 17(6), 1625–1639.

Ahmad, M. (2015). *Inilah yang Terjadi Jika Ibu Hamil Sering Makan MSG. Gaya Hidup.* https://www.cnnindonesia.com/gaya-hidup/20150625152234-255-62378/inilah-yang-terjadi- jika-ibu-hamil-sering-makan-msg/2

Amadea, A. (2021,). *Kisah Kikunae Ikeda Kembangkan Rasa Umami untuk Memperbaiki Gizi Orang Jepang. Kumparan.* https://kumparan.com/kumparanfood/kisah-kikunae-ikeda-kembangkan- rasa-umami-untuk-memperbaiki-gizi-orang-jepang-1v5kRHAYIs7/full

Amani, M. (2020). *MSG Semulajadi untuk Sedapkan Makanan. Root of Science.* https://rootofscience.com/blog/2020/kesihatan/pemakanan/msg-semulajadi-untuk-sedapkan-makanan/

Amy, W. (2018). *Dari Awal Suka Makanan Ringan Dan Tinggi MSG, Anak Sukar Dikawal Dan Hiperaktif.* Pa&Ma. https://www.majalahpama.my/dari-awal-suka-makanan-ringan-dan-tinggi- msg-anak-sukar-dikawal-dan-hiperaktif/

Bond, T. G., & Fox, C. M. (2015). Applying The Rasch Model Fundamental Measurement in the Human Sciences, Third Edition

Carocho, M., Barreiro, M. F., Morales, P., & Ferreira, I. C. F. R. (2014). Adding molecules to food, pros and cons: A review on synthetic and natural food additives. Comprehensive Reviews in Food Science and Food Safety, 13(4), 377–399.

DeVellis, R. F., & Thorpe, C. T. (2021). Scale development: Theory and applications (5th ed.). Sage.

Dietary Guidelines for Americans, 2020–2025. (2020). U.S. Department of Health and Human Services & U.S. Department of Agriculture. 9th Edition. https://www.dietaryguidelines.gov

European Food Safety Authority (EFSA) Panel on Food Additives and Nutrient Sources added to Food (ANS). (2017). Re-evaluation of glutamic acid (E 620) and glutamates (E 621–E 625) as food additives. EFSA Journal, 15(7), e04910. https://doi.org/10.2903/j.efsa.2017.4910

Norziana (2022).Sindrom Restoran Cina – *Pencetus Mitos MSG Lebih Mudarat Daripada Garam*. (2022, January 6). https://people.utm.my/norziana/2022/01/06/sindrom-restoran-cina-pencetus- mitos-msg-lebih-mudarat-daripada-garam/

Obayashi, Y., & Nagamura, Y. (2016). Does monosodium glutamate really cause headache? : a systematic review of human studies. *Journal of Headache and Pain*, *17*(1). https://doi.org/10.1186/s10194-016-0639-4