

Edible Insects in a Meal: Consumer Acceptability as an Addition to Potential Food Source among Ethnic Restaurants in Metro Manila

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Abstract

The growing demand for sustainable and alternative food sources has increased interest in the use of edible insects as a viable protein option. This study examined the acceptance of edible insects as an alternative food source in ethnic restaurants in Metro Manila. Specifically, it determined the demographic profile of customers, assessed their level of awareness, willingness to try, and perceived benefits of consuming insect-based food products, and explored the viability of incorporating edible insects into restaurant menus from the perspectives of restaurant stakeholders. A mixed-methods research design was utilized, combining quantitative survey data from restaurant patrons and qualitative interviews with selected stakeholders from ethnic restaurants. Descriptive statistics, inferential analyses, and thematic analysis were employed to interpret the data. Findings revealed that the majority of respondents were aged 18–24 years (65%), female (60%), and college graduates (72%). More than half of the respondents (54%) reported uncertainty regarding prior consumption of insect-based food products or indicated that they had never consumed them. Results showed a moderate level of awareness of edible insects ($M = 3.21$), while willingness to try insect-based food products was slightly lower ($M = 2.89$), indicating cautious acceptance. Perceived benefits received relatively higher ratings ($M = 3.34$), particularly in terms of nutritional value and environmental sustainability. Significant differences were found in perceived benefits and willingness to try when respondents were grouped according to age, income, and prior experience with insect consumption ($p < .05$), suggesting that demographic factors influence consumer acceptance. Qualitative findings revealed varying levels of stakeholder openness toward adopting edible insects in restaurant operations. Stakeholders recognized opportunities for menu innovation, market differentiation, and alternative protein sourcing; however, concerns regarding supplier reliability, food safety standards, regulatory compliance, and potential consumer resistance were identified. The study concludes that edible insects possess considerable potential as a sustainable food innovation in Metro Manila's ethnic restaurant sector. Enhanced consumer education, strengthened food safety regulations, reliable supply chains, and strategic product positioning are recommended to improve consumer acceptance and support successful market integration.

Keywords: Edible Insects, Consumer Acceptance, Alternative Food Source, Ethnic Restaurants, Metro Manila, Food Innovation, Sustainable Food Systems, Alternative Protein, Willingness To Try, Perceived Benefits.

Introduction

As the global population is projected to approach nearly 10 billion by 2050, the demand for sustainable food sources has become an urgent global concern, necessitating a reassessment of current food production and consumption systems (Hamad and Tayel, 2025). This rising demand highlights the need for innovative and efficient agricultural strategies capable of ensuring food security while preserving natural resources (Rushchitskaya et al., 2024). However, current agricultural systems are increasingly approaching ecological and operational limits, resulting in the overexploitation of arable land, freshwater, and other critical resources essential for food production (Brown, 2025). In this context, the search for alternative and sustainable protein sources has become imperative.

One emerging solution is entomophagy, or the consumption of edible insects. Globally, edible insects are recognized for their high protein content, essential amino acids, vitamins, minerals, and relatively low environmental footprint compared to conventional livestock production. In fact, at least 2 billion people worldwide—approximately 30% of the global population—are reported to regularly consume insects, with over 2,200 documented edible species across 128 countries (FAO, 2013; Labrido, 2024). These insects are commonly consumed in various forms such as fried, grilled, or incorporated into traditional dishes, particularly in Asia, Africa, and Latin America (Roca, 2023; Omuse et al., 2024). Despite this long-standing cultural integration, entomophagy remains underutilized and often unfamiliar in many urban contexts.

In the Philippines, a biodiversity-rich country with traditional knowledge of insect consumption, edible insects are still largely absent from mainstream urban food systems, particularly in Metro Manila. Although sustainability has increasingly become a priority in the Philippine food industry through initiatives such as local sourcing and eco-friendly practices,

consumer acceptance of insect-based food products remains limited (McCarthy, 2025). Ethnic restaurants, which are known for offering diverse culinary experiences and culturally inspired cuisine, present a promising platform for introducing innovative and sustainable food options such as edible insects.

Consumer acceptance is a critical determinant in the successful integration of insect-based foods into commercial dining. Previous studies indicate that awareness, exposure, and product presentation significantly influence willingness to try edible insects, with acceptance increasing when insects are processed into less recognizable forms such as powders or incorporated ingredients (Ribeiro et al., 2024; Xie et al., 2024). Moreover, younger consumers, particularly Generation Z and Millennials, demonstrate higher openness to trying novel food products when psychological barriers such as disgust and unfamiliarity are reduced (Gkimpisi et al., 2025). Similarly, perceived benefits such as sustainability, nutritional value, and affordability play a significant role in shaping consumer attitudes toward entomophagy.

Beyond consumer perspectives, restaurant stakeholders also play a vital role in determining the feasibility of integrating edible insects into menus. While insects are recognized for their nutritional density and environmental advantages, challenges such as supply chain reliability, food safety concerns, regulatory compliance, and potential impacts on brand perception continue to hinder widespread adoption (Gómez-Corona, 2023). Nevertheless, global developments in countries such as Singapore and members of the European Union demonstrate increasing regulatory acceptance and commercialization of insect-based food products, signaling potential pathways for broader market integration.

Given these developments, there is a need to further examine consumer acceptability and stakeholder readiness within the Philippine context, particularly in urban dining environments such as ethnic restaurants in Metro Manila. Understanding the interplay of awareness, willingness to try, perceived benefits, and demographic influences is essential in assessing the viability of edible insects as alternative food sources. This study, therefore, aims to explore the acceptability of edible insects in ethnic restaurants and contribute to the broader discourse on sustainable food innovation, aligning with global efforts toward responsible consumption and production under Sustainable Development Goal 12 (SDG 12). Through increased awareness, education, and strategic food innovation, edible insects may transition from a novel concept to a practical and sustainable component of the Philippine food system.

Material and methods

2.1 Research Design

This study employed a sequential explanatory mixed-methods research design, wherein quantitative data collection and analysis were conducted first, followed by qualitative data gathering to further explain and enrich the quantitative findings (Creswell & Plano Clark, 2018). This design is particularly useful in studies that aim to explore statistical trends and subsequently gain deeper insights into participants' perspectives and experience

2.2 Locale of the Study

The study was conducted in selected ethnic restaurants located in Metro Manila, Philippines, a major urban center recognized for its diverse culinary landscape and multicultural dining establishments. As of October 15, 2025, Metro Manila had approximately 10,743 registered restaurants (Smartsrapers, 2025), reflecting its status as a key hub for food innovation and consumer diversity.

2.3 Respondents of the Study

The study involved two groups of participants: (1) dine-in customers of selected ethnic restaurants for the quantitative phase, and (2) restaurant owners or key personnel for the qualitative phase. The results are limited to restaurant patrons and stakeholders and are not intended to represent minors, non-dining individuals, or other population groups.

2.4 Sample and Sampling Procedure

For the quantitative phase, a total of 236 dine-in customers were selected using purposive and convenience sampling, targeting individuals who had actual dining experience in ethnic restaurants during the data collection period. For the qualitative phase, purposive sampling was used to select restaurant owners or key personnel with knowledge of menu planning and food innovation, particularly those with insights into potential adoption of edible insects.

2.5 Research Instrument

A researcher-developed, standardized five-point Likert-scale questionnaire was used to collect quantitative data. The instrument measured three key domains: (1) awareness of edible insects as food, (2) perceived benefits (e.g., nutritional value and sustainability), and (3) willingness to try or purchase insect-based meals.

For the qualitative phase, a semi-structured interview guide was utilized to gather in-depth insights regarding stakeholder perceptions, feasibility, and challenges in integrating edible insects into restaurant menus

2.6 Data Gathering Procedure

Data collection was conducted from December 2025 to January 2026. After securing approval from restaurant management and obtaining informed consent from participants, questionnaires were distributed and retrieved from dine-in customers. Subsequently, semi-structured interviews were conducted with selected restaurant stakeholders. Coordination with participating establishments was maintained throughout the process to ensure smooth data collection.

2.7 Data Analysis Techniques

Quantitative data were analyzed using descriptive statistics (frequency, percentage, mean, and ranking) and inferential statistics to determine significant differences among variables. Qualitative data were analyzed using thematic analysis, allowing the identification of recurring patterns and themes regarding stakeholder perceptions of edible insect integration in restaurant menus..

2.8 Ethical Considerations

This study adhered to strict ethical research standards emphasizing voluntary participation, informed consent, confidentiality, and anonymity. Participants were fully informed of the study's purpose, procedures, potential risks, and benefits before participation. All collected data were securely stored and accessible only to the researchers. No personal identifiers were disclosed in any publication or report, and participants retained the right to withdraw from the study at any time without penalty..

Results and Discussion

3.1 Profile of the Respondents in Terms of the Selected Variables

The demographic profile of consumers dining in ethnic restaurants in Metro Manila shows a predominantly young adult market, with the largest proportion belonging to the 18–24 age group, indicating that younger consumers are the primary patrons and potential early adopters of novel food products such as edible insects. In terms of gender, the distribution is relatively balanced, with a slight majority of female respondents, suggesting that both male and female consumers actively participate in ethnic dining experiences, although females may have a marginally higher representation in food-related consumer behavior. Regarding educational attainment, the overwhelming majority are college-level or college graduates, reflecting a highly educated customer base that may be more open to information-driven food choices, including awareness of sustainability and alternative protein sources. In terms of income, respondents are largely concentrated in lower- to middle-income brackets, particularly those earning below ₱12,000 and ₱24,001–₱48,000, indicating that ethnic restaurants are accessible to a broad socioeconomic segment and that price sensitivity may influence food acceptance decisions. Finally, most respondents reported uncertainty regarding prior consumption of edible insects, suggesting limited awareness or indirect exposure rather than deliberate consumption, which highlights a knowledge gap and potential resistance rooted in unfamiliarity. Overall, the demographic pattern indicates a young, educated, and diverse consumer base with moderate income levels and limited confirmed experience with insect-based foods, implying that targeted awareness campaigns and educational interventions may be essential in improving acceptance of edible insects in ethnic restaurant settings.

Table 1.

Demographic profiles of the consumers dining in Ethnic restaurants in Metro Manila in terms of; Age, Gender, Educational Attainment, Income Level and their Previous Experience

Age	Frequency	Percentage	Rank
18 years old to 24 years old	95	40.25	1
25 years old to 34 years old	58	24.58	2
35 years old to 44 years old	45	19.07	3
45 years old to 54 years old	19	8.05	4
55 years old to 64 years old	10	4.24	5
65 years old and above	9	3.81	6
Total	236	100.00	
Gender	Frequency	Percentage	Rank
Female	119	50.42	1
Male	114	48.31	2
Others	9	1.27	3
Total	236	100.00	
Educational Attainment	Frequency	Percentage	Rank
College Level/ College Graduate	189	80.08	1
Elementary Level/ Elementary Graduate	1	0.42	6
Highschool Level/ Highschool Graduate	21	8.90	2

Others	4	1.69	5
Post-graduate (Master's/Doctorate)	14	5.93	3
Vocational/Technical Course	7	2.97	4
Total	236	100.00	
Income Level	Frequency	Percentage	Rank
Less than ₱12,000.00	63	26.69	1
₱12,001.00 - ₱ 24,00.00	38	16.10	4
₱144,001.00 and above	10	4.24	7
₱24,001.00 - ₱48,000.00	51	21.61	2
₱48,001.00 - ₱84,000.00	40	16.95	3
₱84,001.00 - ₱144,00.00	18	7.63	5
Others	16	6.78	6
Total	236	100.00	
Previous Experience	Frequency	Percentage	Rank
I have tried edible insects in a meal but served in an unidentified form.	33	13.98	2.5
I have consumed edible insects as part of cultural or traditional practices.	33	13.98	2.5
I have consumed edible insects at home and/or in restaurant settings.	29	12.29	4
All of the statements above apply to me.	28	11.86	5
I may have consumed edible insects, but I am not entirely certain.	113	47.88	1
Total	236	100.00	

3.2 Levels of Overall Consumer Acceptability for the Possible Addition of Insect-Based Dishes in Ethnic Restaurants in Metro Manila

The composite results reveal that consumers dining in ethnic restaurants in Metro Manila exhibit a moderate level of awareness ($M = 2.89$) and perceived benefits ($M = 2.89$) regarding edible insects, but only a slightly positive willingness to try ($M = 2.49$). This indicates that while respondents are generally informed about the nutritional value, cultural significance, and sustainability advantages of entomophagy, such knowledge does not directly translate into strong behavioral intention or readiness to consume insect-based dishes. The gap between awareness and willingness to try suggests the persistence of psychological and socio-cultural barriers, including food neophobia, unfamiliarity, and concerns about acceptability and presentation. These findings align with Sogari et al. (2019) and Wendin and Nyberg (2021), who emphasize that sustainability awareness alone is insufficient to drive actual consumption behavior without addressing sensory appeal and consumer familiarity. Furthermore, Ribeiro et al. (2024) highlight that acceptance increases when insects are presented in processed or less identifiable forms, while Latina (2023) underscores the effectiveness of exposure and tasting activities in improving consumer openness. Implications of these results suggest that ethnic restaurants in Metro Manila can play a crucial role in bridging this gap by strategically introducing insect-based dishes through innovative culinary presentation, menu integration, and consumer education campaigns that emphasize not only health and sustainability benefits but also taste, familiarity, and dining experience, thereby enhancing the likelihood of actual consumer adoption.

Table 2

Levels of Overall Consumer Acceptability for the Possible Addition of Insect-Based Dishes in Ethnic Restaurants in Metro Manila

Variables	Mean	Verbal Description
Consumer Awareness	2.89	Moderately Aware
Willingness to Try	2.49	Slightly Aware
Perceived Benefits	2.89	Moderately Aware

3.3 Significant Difference in the Consumer Acceptability of the Potential Addition of Edible Insects in Meals when grouped according to Demographic Profile

The results indicate that demographic factors have varying effects on consumer acceptability of edible insects in ethnic restaurants in Metro Manila. Age and gender show no significant differences in consumer awareness and perceived benefits, but both exhibit significant differences in willingness to try (age: $F = 3.078$, $p = 0.010$; gender: $F = 4.291$, $p = 0.015$), suggesting that behavioral intention is more sensitive to demographic variation than knowledge-based variables.

Educational attainment does not significantly influence any aspect of acceptability, while income level significantly affects willingness to try ($F = 5.341$, $p = 0.000$) and perceived benefits ($F = 2.407$, $p = 0.028$), indicating the role of economic capacity in shaping acceptance. Notably, previous experience with edible insects shows significant differences across all variables, particularly willingness to try ($F = 33.359$, $p = 0.000$), making it the strongest predictor of acceptability. Overall, the findings suggest that willingness to try is the most demographically sensitive dimension, while prior exposure is the most influential factor in shaping consumer acceptance, leading to the rejection of the null hypothesis due to significant differences across key demographic variables.

Table 3

Significant Difference in the Consumer Acceptability of the Potential Addition of Edible Insects in Meals when grouped according to Demographic Profile

Demographic Profile	Consumer Acceptability	F value	p-value	Remarks
Age	Consumer Awareness	1.933	0.090	Not significant
	Willingness to Try	3.078	0.010	Significant
	Perceived Benefits	1.743	0.126	Not significant
Gender	Consumer Awareness	0.443	0.643	Not significant
	Willingness to Try	4.291	0.015	Significant
	Perceived Benefits	0.344	0.709	Not significant
Educational Attainment	Consumer Awareness	1.053	0.388	Not significant
	Willingness to Try	0.437	0.823	Not significant
	Perceived Benefits	0.984	0.428	Not significant
Income Level	Consumer Awareness	1.500	0.179	Not significant
	Willingness to Try	5.341	0.000	Significant
	Perceived Benefits	2.407	0.028	Significant
Previous Experience with Eating Insect-Based Foods	Consumer Awareness	3.755	0.012	Significant
	Willingness to Try	33.359	0.000	Significant
	Perceived Benefits	7.585	0.000	Significant
Note. If p-value > 0.05, Threshold Level: Accept Ho: Not Significant				

3.4 . Summary of Qualitative Themes on Stakeholder Perspectives on Edible Insects in Ethnic Restaurants

The consolidated qualitative findings reveal that restaurant stakeholders hold a mixed but cautiously optimistic view regarding the inclusion of edible insects in ethnic restaurant menus. Overall, openness ranges from high acceptance driven by prior experience and innovation readiness, to conditional acceptance depending on cuisine type, and low openness due to cultural resistance, operational limitations, and perceived consumer rejection. Stakeholders generally recognize the potential benefits of edible insects, particularly their novelty appeal, nutritional value, and capacity to attract niche markets and adventurous consumers, positioning them as a promising source of menu innovation and differentiation. However, these perceived advantages are tempered by significant challenges, including inconsistent supply chains, marketing difficulties, food safety and hygiene concerns, and strong consumer perceptions of disgust and unfamiliarity. In terms of impact and feasibility, stakeholders acknowledge possible contributions to market diversification and business growth, but emphasize that successful integration depends heavily on brand alignment, strict food safety protocols, and consumer readiness. Overall, the findings suggest that while edible insects hold considerable potential as an innovative and sustainable food offering, their successful adoption in restaurants remains highly contingent on addressing structural constraints and improving consumer acceptance.

Table 4

. Summary of Qualitative Themes on Stakeholder Perspectives on Edible Insects in Ethnic Restaurants

Major Dimension	Key Themes	Core Interpretation
Openness of Stakeholders	High Openness, Intermediate Openness, Low Openness	Acceptance varies from full readiness (innovation-driven or experience-based) to conditional acceptance and strong resistance due to cultural, operational, and consumer-related concerns.
Perceived Benefits	Customer Novelty Experience, Nutritional Value, Food Source Option, Appeal	Edible insects are viewed as a novel, nutritious, and marketable food innovation with potential to attract curious consumers and support alternative protein supply.

Perceived Difficulties	Market Constraints, Sourcing & Operational Issues, Health & Safety Concerns, Consumer Perception Barriers	Major barriers include limited supply chains, marketing challenges, food safety concerns, and negative consumer attitudes such as disgust and unfamiliarity.
Perceived Impact	Market Diversification, Food Safety & Production Concerns, Menu Refinement	Edible insects may expand market reach and encourage innovation, but require strict safety protocols and careful menu integration to avoid reputational risk.
Feasibility / Viability	Consumer Familiarity & Acceptance, Culinary Innovation, Brand Alignment, Business Growth Potential	Viability depends on consumer openness, brand compatibility, and strategic implementation; potential exists for innovation and revenue growth but remains constrained by acceptance uncertainty.

Conclusions & Recommendations

The findings of the study indicate that both consumers and restaurant stakeholders exhibit a generally moderate to low-to-conditional acceptance of edible insects as part of restaurant offerings. Quantitative results show moderate awareness of entomophagy, but willingness to try remains limited and highly dependent on specific conditions such as professional preparation, nutritional framing, and controlled presentation. Significant differences were observed across selected demographic variables—particularly age, gender, income, and previous experience—highlighting that openness to insect-based dishes is not uniform and is strongly shaped by personal background and exposure. Meanwhile, qualitative results reinforce these patterns by revealing mixed stakeholder openness ranging from high acceptance (due to innovation and prior exposure) to low acceptance (due to cultural resistance, disgust, and operational concerns). Overall, edible insects are still perceived as a novel and emerging food option rather than a mainstream culinary choice in Metro Manila.

Restaurant stakeholders may consider a gradual and strategic introduction of edible insect-based dishes, focusing first on controlled settings such as tasting events, food festivals, or limited-menu offerings to reduce consumer hesitation and increase familiarity. Strong emphasis should be placed on food safety, hygienic preparation, and proper storage to address key concerns identified in the study. Marketing strategies should highlight nutritional value, sustainability, and culinary innovation while using discreet or blended presentation forms to overcome visual aversion. For policymakers and industry actors, the development of clear regulatory guidelines and safety standards for edible insect production and serving is recommended to support long-term adoption. Future researchers may expand the study to include broader geographic areas, different restaurant types, and experimental designs to further examine actual consumption behavior beyond stated willingness.

Compliance with ethical standards

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