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Drivers of The Organic Mushroom Market in Kathmandu Valley: A Dual-Perspective Analysis of Consumer Willingness-To-Pay and Producer Viability

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ABSTRACT

The demand for safe and organic food is rising in urban Nepal, but the market for organically grown mushrooms remains underdeveloped. Understanding consumer behavior and producer readiness is crucial for market development. This study aimed to assess mushroom consumption patterns, awareness, access disparities, and willingness to pay (WTP) for organic mushrooms in Kathmandu Valley, integrating perspectives from both consumers and producers. A mixed-methods approach was employed. Data were collected from 150 consumers through a structured online survey and from 10 producers/traders via in-person interviews. Analysis involved descriptive statistics, chi-square tests, binary logistic regression, and cost-benefit analysis. A vast majority (94.7%) of respondents consumed mushrooms, primarily driven by taste and nutritional value. Awareness of organic mushrooms was high (88%) and significantly associated with education level ($p<0.05$). Social networks and social media were the primary information sources. While access to conventional mushrooms was widespread, 45% of consumers were willing to pay a premium for organic varieties. Logistic regression confirmed awareness as a critical determinant of WTP (Odds Ratio = 7.67, $p=0.001$). On the supply side, 70% of producers expressed willingness to adopt organic methods, and cost-benefit analysis indicated moderate profitability (Average B: C Ratio = 1.49), though challenges like price fluctuations and pests were common. This study highlights that there is significant potential for an organic mushroom market in Kathmandu Valley. Realizing this potential requires integrated strategies focusing on consumer education, establishing trustworthy certification, and providing targeted support to producers to overcome operational challenges.

Keywords: Awareness, consumer behavior, cost-benefit analysis, organic mushrooms, sustainable agriculture

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INTRODUCTION

Nepal's diverse agroecology supports a rich myco-biota, with over 400 recorded mushroom species, of which more than 100 are edible (Adhikari, 2014). Historically foraged from the wild, mushroom cultivation has gained momentum over recent decades, transforming into a recognized agricultural subsector (Poudel,2018). As heterotrophic organisms, mushrooms efficiently convert lignocellulosic waste from agriculture and forestry into nutritious food, representing a promising avenue for sustainable intensification and the circular economy (Chávez, 2019, and Sapkota, 2022). Globally, mushroom production has seen a sixfold increase in the last twenty years, with China dominating the market (FA0,2021). The global mushroom market was valued at approximately USD 62.3 billion in 2023 and is projected to grow at a CAGR of 9.1%, reaching around USD 136.9 billion by 2032 (Devochkina,2024). This growth is driven by rising consumer awareness of their health benefits, which include bioactive compounds like polysaccharides, peptides, and phenolic compounds (Devochkina,2024).

Despite Nepal's rich biodiversity of over 1,150 mushroom species, commercial cultivation is limited to about five species, with oyster mushrooms (*Pleurotus ostreatus*) constituting 86% of production (Raut,2019). While this sector offers significant income-generation potential for farmers, Acharya and Tiwari (2021), commercial expansion remains restricted, and participation in mushroom cultivation remains low (Acharya and Dhungel,2021). Nepal is concurrently experiencing rapid urbanization, particularly in the Kathmandu Valley, the nation's economic hub (Timsina,2022, and Khatri,2024). This urbanization drives changes in dietary patterns, with a growing urban middle class showing increased interest in health-conscious and safe food products (Singh and J.D., 2024). However, the conventional cultivation of mushrooms often involves unregulated pesticide use, raising public health concerns (Dhakal,2024). Organically grown mushrooms present a safer alternative but face considerable market barriers, including low consumer awareness, absent certification mechanisms, and underdeveloped supply chains (Khanal 2020; Regmi 2023). Furthermore, access to such premium products is often inequitable, disproportionately affecting peri-urban and low-income populations *(*Mishra et al., 2024). While previous studies in Nepal have explored general organic food consumption (Regmi, 2023; Aryal, 2009) and examined the profitability of mushroom enterprises Phuyal (2023), a critical gap exists in understanding the specific market dynamics for organic mushrooms, particularly the interplay between consumer awareness, WTP, and producer economics. This study aims to fill this gap by providing a dual-perspective

analysis of the potential for organic mushrooms in the Kathmandu Valley. Specifically, it investigates: (1) mushroom consumption patterns and access, (2) awareness and determinants of WTP for organic varieties, and (3) the economic viability and challenges of production from the farmers' perspective.

MATERIALS AND METHODS

Study Area: The study was conducted in the Kathmandu Valley, comprising three districts: Kathmandu, Lalitpur, and Bhaktapur. As the country's most urbanized and populous region, it serves as the primary market for premium and organic food products, making it an ideal site for this investigation.

Research design and sampling: A cross-sectional, mixed-methods design was employed. The consumer sample, while stratified, was relatively small (n = 150), yet it provided a meaningful and balanced representation of respondents across the three districts. The final sample size was determined through a combination of Cochran's sample size formula for large populations and practical feasibility considerations.

Cochran's formula was applied as follows:

$$n_0 = Z^2 \times p \times q / e^2$$

Where:
- n_0 = required sample size for an infinite population
- Z = Z-value (1.96 for 95% confidence level)
- p = estimated population proportion (0.5 assumed for maximum variability)
- q = 0.5
- e = margin of error (0.08 or 8%)

Substituting the values:

$$n_0 = (1.96^2 \times 0.5 \times 0.5) / 0.08^2$$
$$= (3.8416 \times 0.25) / 0.0064$$
$$= 0.9604 / 0.0064$$
$$\approx 150.06$$

The sample was proportionally allocated according to the Central Bureau of Statistics (CBS) 2021 population data: 101 from Kathmandu, 27 from Lalitpur, and 22 from Bhaktapur. For the producer survey, a purposive sampling method was used to identify and interview 10 active mushroom producers/traders within the valley to gain in-depth qualitative and economic data.

Pilot testing: Before the final survey, a pilot test was conducted with 10 respondents from Kathmandu Valley. The purpose of the pilot test was to evaluate the clarity, relevance, and reliability of the questionnaire, as well as to identify any ambiguities or difficulties faced by respondents. Feedback from the pilot study was carefully reviewed, and minor modifications were made to the wording and sequencing of questions to improve comprehension and minimize bias. Primary data were collected between April and July 2025. Consumer data were gathered primarily through a structured online questionnaire administered via Google Forms, distributed through social media and community networks. To mitigate digital bias, this was supplemented with 10 in-person interviews with producers and traders, which also provided insights into supply-side dynamics. The consumer questionnaire covered sections on socio-demographics, consumption patterns, access and availability, awareness of organic mushrooms, and willingness to pay. The producer interview guide focused on production costs, revenues, challenges, and perceptions of the organic market. Secondary data were sourced from the CBS, the Ministry of Agriculture and Livestock Development (MoALD), FAO reports, and relevant peer-reviewed literature.

Data analysis : Quantitative data from consumers were coded, cleaned, and analyzed using SPSS (Version 26) and Microsoft Excel. Analysis included:

- **Descriptive statistics** to summarize socio-demographic and consumption variables.
- **Chi-square tests** to examine associations between categorical variables (e.g., income and price sensitivity).
- **Binary Logistic Regression** to identify factors influencing WTP for organic mushrooms. The dependent variable was WTP (willing = 1, not willing = 0). Key independent variables included awareness, education, and income.
- **Ranking Analysis** using an index value to prioritize factors influencing consumer purchase decisions.
- **Geographic Information System (GIS)** tools were used to map and visualize the spatial distribution and accessibility of organic mushrooms across urban and peri-urban areas of Kathmandu, Lalitpur, and Bhaktapur.

Producer data were analyzed using a cost-benefit analysis to calculate the Benefit-Cost (B:C) ratio for different mushroom varieties. Total cost included substrate, spawn, utilities, packaging, and other operational costs; family labor was excluded.
The Benefit-Cost Ratio (B: C Ratio) was calculated using the formula:

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B:C Ratio=Total Revenue (NPR)/Total Cost (NPR)

Ethical considerations and limitations: Verbal informed consent was obtained from all participants before data collection. The study acknowledges several limitations. The consumer sample, while stratified, is modest and was primarily collected online, which may underrepresent segments of the population with limited digital access, potentially introducing selection bias. The producer sample is small and not representative of all producers in the valley. Furthermore, WTP was measured through stated preference, which may not accurately reflect actual market behavior. These limitations restrict the generalizability of the findings and should be taken into account when interpreting the results.

RESULTS AND DISCUSSIONS

Socio-demographic profile and mushroom consumption patterns

The study involved 150 respondents from Kathmandu Valley. Nearly half of the respondents were aged 18–25, with progressively smaller proportions represented in older age groups. The gender distribution was relatively balanced, with males comprising 55% and females 44% of the sample. Educational attainment was generally high, as the majority held a bachelor's degree (44.7%) or a master's degree and above (30.7%). Students formed the largest occupational group (45.3%), followed by individuals in government or private service (30.7%). Household income varied, though most respondents reported earnings between NPR 20,000 and 60,000 per month. In terms of location, two-thirds of participants resided in Kathmandu District, with the remainder from Lalitpur and Bhaktapur. Overall, the sample reflects a relatively young, educated, and urban population.

The vast majority of respondents (94.7%) were mushroom consumers, confirming their widespread popularity in the urban market of Kathmandu Valley, consistent with its status as a major consumption hub in Nepal (Aryal,2009). Button mushrooms (*Agaricus bisporus*) were the most commonly consumed (76.4%), followed by oyster mushrooms (53.5%), reflecting established production and market supply patterns (Raut,2019). In this study, 94.7% of respondents reported consuming mushrooms, indicating a very high prevalence of mushroom consumption in the Kathmandu Valley. This aligns with earlier studies identifying Kathmandu as a key urban market where awareness, demand, and consumption of mushrooms have grown steadily (Aryal, 2009). National assessments similarly note increasing production and rising

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urban uptake of commonly cultivated species such as button and oyster mushrooms. Consumption frequency was moderate; 44% consumed mushrooms 2-3 times per month, while only 2.7% were daily consumers (Table 2).

Table 1. The sociodemographic profile of survey respondents

Variables	Characteristics	n	Percentage (%)
Age	<18	7	4.7
	18-25	72	48
	26-35	21	14
	36-45	18	12
	46-60	19	12.7
	Above 60	13	8.7
Gender	Female	66	44
	Male	83	55
	Other	1	1
Education	No formal education	4	2.6
	Primary	6	4
	Higher secondary	27	18
	Bachelor	67	44.7
	Master's or Higher	46	30.7
Occupation	Students	68	45.3
	Private/Government Service	46	30.7
	Business	15	10
	Teacher	9	6
	Other	12	8.1
Income	20k–40k	47	31.3
	40k–60k	42	28
	60k–80k	26	17.3
	80k–1 Lakh	18	12
	Above 1 Lakh	17	11.4
Location	Kathmandu	101	67
	Lalitpur	27	18
	Bhaktapur	22	15

Source: Field Survey, 2025

This pattern suggests that mushrooms are predominantly perceived as a supplementary vegetable or a culinary ingredient for variety, rather than a dietary staple. This

indicates significant potential for market growth through campaigns promoting their nutritional benefits and culinary versatility to increase consumption frequency.

Table 2. Frequency of mushroom consumption (N=150)

Frequency	Frequency (N)	Percent)
Rarely	39	26
2-3 times/month	66	44
Weekly	27	18
2-3 times/week	14	9.3
Daily	4	2.7
Total	150	100

Source: Field Survey, 2025

A Likert-scale analysis revealed that taste was the primary driver of consumption (Mean=3.25), whereas mushrooms were less commonly perceived as a regular part of the diet (Mean=2.49) or a meat substitute (Mean=2.34). This aligns with global studies, such as (Predanócyová et al., 2023) in Slovakia, which also found sensory preference to be the leading motivator, surpassing health and environmental concerns. These results provide insight into consumer attitudes toward mushroom consumption in the Kathmandu Valley, suggesting that while mushrooms are valued for taste, they are not yet widely perceived as a dietary staple or meat substitute.

Access, availability, and perceived barriers

Access to conventional mushrooms was not a major constraint, with 95.3% of respondents reporting easy access. The most common purchase sources were local markets (61.9%), street vendors (57.1%), and direct purchases from farmers (55.8%), highlighting the critical role of informal, trust-based channels in the fresh produce sector. Supermarkets were used by 48.3%, while online purchases were minimal (12.9%), reflecting the nascent stage of digital food retailing in Nepal, a sector hampered by challenges like limited trust, quality concerns, and underdeveloped logistics (Parajuli,2024). The most significant barrier to consumption was high price (67.6% of cases), followed by taste preferences (53.5%) and distrust in sellers (39.4%). A chi-square test found no significant association between income level and being limited by high price ($p > 0.49$), indicating that cost sensitivity is a universal concern across income groups for this non-staple food item. This finding is supported by Owusu and Dekagbey (2020), who identified price as a major factor influencing the purchase of edible mushrooms, with consumers across income brackets demonstrating sensitivity to price points.

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Awareness of organic mushrooms and their influence on willingness to pay

Awareness of organically grown mushrooms was high (88%), which is a positive indicator for market potential. Friends and family (32%) and social media (26.7%) were the dominant sources of awareness. A significant association was found between the respondents' education level and their source of awareness ($\chi^2 = 38.79$, $p = 0.029$), with more highly educated individuals relying more on social networks and digital media. This underscores the need for formal, accessible public education campaigns to reach a broader demographic beyond the highly educated, who currently benefit from informal knowledge transfer. These patterns are supported by Rokaya and Pandey (2024) found that social media and interpersonal networks are critical channels for organic product awareness in Nepal. A key finding of this study is the powerful role of awareness in shaping WTP. Overall, 58% of consumers were willing to pay a premium for organic mushrooms, with 40.7% willing to pay a 5% premium and 28.7% willing to pay 10% more. Binary logistic regression identified awareness as the most significant predictor of WTP (Table 4). Consumers aware of organic mushrooms were 7.67 times more likely to be willing to pay a premium ($p=0.001$). This robustly demonstrates that knowledge is a primary lever for market creation and aligns with studies in similar contexts, such as Shrestha and Baral (2009), which found that awareness of health and safety benefits significantly increased WTP for organic products in Nepal.

Willingness to pay for organic mushrooms

The survey findings show a generally positive consumer attitude toward paying a premium for organically grown mushrooms. Among 150 respondents, 58% reported willingness to pay more, while 26% expressed conditional interest. Only 16% were unwilling to pay extra, indicating limited price sensitivity. These results align with previous studies in Nepal, such as Regmi (2023), which reported strong consumer support for premium pricing on organic produce, particularly among individuals with higher awareness, education, and income levels.

Table 3. Chi-Square test results for the association between education level and medium of awareness about organic mushrooms

Test	Value	df	Sig.
Pearson Chi-Square	38.793	24	0.029
Likelihood Ratio	44.165	24	0.007

Source: Field Survey, 2025

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Table 4. Logistic regression of awareness on willingness to pay a premium

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Awareness	2.037	0.585	12.112	1	0.001	7.668
Constant	-1.447	0.556	6.779	1	0.009	0.235

Source: Field Survey, 2025

The survey results indicate that a clear majority of respondents (128 of 150; 85.4%) are willing to pay a premium for organically grown mushrooms, while 22 (14.7%) are unwilling. The willingness is concentrated at modest levels: 61 (40.7%) would pay 5% more, 43 (28.7%) would pay 10% more, 14 (9.3%) would pay 20% more, and 10 (6.7%) would pay over 20% extra. (Note: the previously reported figure of 58% was from an earlier draft and is incorrect; the table-based totals above are the accurate values.) These findings demonstrate broad openness to modest price increases, with only a small segment prepared to pay substantially higher premiums.

Table 5. Respondents' willingness to pay a premium for organic mushrooms

Willingness to Pay (Premium)	Frequency (N)	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
None at all	22	14.7	14.7	14.7
5% more	61	40.7	40.7	55.3
10% more	43	28.7	28.7	84
20% more	14	9.3	9.3	93.3
More than 20%	10	6.7	6.7	100
Total	150	100	100	—

Source: Field Survey, 2025

When ranking purchase factors for organic mushrooms, consumers prioritized packaging, organic labeling, and appearance, while taste and price were ranked lowest. This indicates that in the context of organic products, consumers value cues that signal safety, quality, and credibility above basic attributes like taste and cost. This finding contrasts with the general consumption motive (where taste was primary) and suggests that trust-building through certification and presentation is paramount for the organic segment. Empirical evidence from other studies supports this; for instance, Predanócyová et al. (2023) also found that trust-related factors like packaging were highly valued.

Health benefits were identified as the primary determinant for purchasing organically grown mushrooms (30.7%), followed by taste (24%) and organic certification (20.7%). Support for local farmers (10.7%) and considerations of sustainability or food

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safety (14%) were less influential, indicating that personal health and sensory attributes predominantly drive consumer decisions in the Kathmandu Valley. These findings are consistent with previous studies in Nepal. Regmi (2023) identified health, taste, freshness, environmental considerations, and certification as key predictors of WTP, influenced by education and income. Khanal (2020) noted willingness to pay for health and safety benefits, despite cost and information barriers, while Aryal (2009) highlighted certification, perceived health and quality, and taste as major factors in Kathmandu Valley.

Table 6. Ranking of factors influencing consumer preference for organic mushrooms

Factor	1st	2nd	3rd	4th	5th	6th	Index Value	Rank
Packaging	31 (20.7%)	19 (12.7%)	26 (17.3%)	28 (18.7%)	27 (18.0%)	19 (12.7%)	0.602	1
Organic Label	27 (18.0%)	26 (17.3%)	29 (19.3%)	20 (13.3%)	22 (14.7%)	26 (17.3%)	0.598	2
Appearance	25 (16.7%)	26 (17.3%)	27 (18.0%)	22 (14.7%)	27 (18.0%)	23 (15.3%)	0.59	3
Freshness	25 (16.7%)	28 (18.7%)	18 (12.0%)	28 (18.7%)	24 (16.0%)	27 (18.0%)	0.579	4
Taste	20 (13.3%)	22 (14.7%)	27 (18.0%)	33 (22.0%)	25 (16.7%)	23 (15.3%)	0.567	5
Price	22 (14.7%)	29 (19.3%)	23 (15.3%)	19 (12.7%)	25 (16.7%)	32 (21.3%)	0.564	6

Source: Field Survey, 2025

Note: 1st-Most Important to least important

Producer perspectives, economic viability, and market challenges

The survey of 10 producers revealed that oyster mushroom cultivation was most prevalent. The majority (70%) were willing to adopt organic methods, and 60% perceived a growing demand for organic products, signaling a readiness on the supply side to respond to market signals. Major production challenges included pests/diseases (30%), price fluctuations (20%), and substrate availability (20%). These constraints are consistent with broader literature on smallholder agriculture in Nepal Raut (2019) and Acharya and Tiwari (2021) and point to areas where technical and market support are urgently needed to enhance sustainability and reduce risks.

Table 7. Perceived risk factors in mushroom production

Production Challenge	Frequency (N)	Percent (%)
Pest/disease	3	30
Price fluctuation	2	20
Substrate issues	2	20
Climate instability	2	20
Labor shortage	1	10
Total	10	100

Source: Field Survey, 2025

Table 8. Production cost and revenue analysis of sample farms (N=10)

S.N	Mushroom Type	Land Size (Ropani)	Total Cost (NPR)	Total Revenue (NPR)	B: C Ratio
1	Oyster	2	37,000	67,716	1.83
2	Button	3	71,000	116,708	1.64
3	Shiitake	4	103,000	67,203	0.65
4	Oyster	1.8	32,500	55,302	1.7
5	Button	2	51,500	81,567	1.58
6	Shiitake	5	115,000	79,772	0.69
7	Oyster	2.5	41,500	74,385	1.79
8	Oyster	1.5	30,000	46,940	1.56
9	Button	2.5	60,500	93,367	1.54
10	Oyster	3	45,500	86,185	1.89

Source: Field Survey, 2025

Cost-benefit analysis showed that oyster and button mushroom production was profitable, with B: C ratios ranging from 1.56 to 1.89 and 1.54 to 1.64, respectively (Table 7). In contrast, shiitake cultivation was less economically viable (B: C ratios of 0.65 and 0.69) due to higher input costs and longer cultivation cycles. The average B: C ratio across all farms was 1.49, indicating moderate profitability and confirming the economic feasibility of mushroom cultivation as noted in previous studies (Phuyal,2023). The low profitability of shiitake highlights how variety selection is critical for financial sustainability and that targeted technical and financial support would be needed to commercially scale such premium varieties.

These findings suggest that oyster and button mushrooms offer relatively stable economic returns, whereas improvements in production efficiency and cost management are needed to enhance the viability of shiitake farming.

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CONCLUSION

Based on the empirical findings of this study, the development of a viable organic mushroom market in Kathmandu Valley is contingent upon the establishment of a robust regulatory and educational framework. The identified causal relationship between consumer awareness and willingness-to-pay (OR = 7.67) necessitates the implementation of science-based public outreach programs and a standardized, verifiable organic certification protocol to reduce information asymmetry and build market confidence. Concurrently, supply-side interventions must focus on enhancing technical efficiency through the dissemination of integrated pest management strategies and optimized substrate formulation to improve benefit-cost ratios. Strengthening market linkages and developing risk-mitigation financial instruments are crucial to ensuring sector resilience and facilitating the transition to a sustainable, knowledge-driven organic mushroom production system.

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