



“A PRIMARY STUDY ON CONSUMER AWARENESS, PERCEPTION, AND CONSUMPTION PATTERNS OF SUGAR ALTERNATIVES AMONG ADULTS IN URBAN AHMEDABAD”

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Abstract: This research examines consumer awareness, perception, and consumption patterns of sugar alternatives among 150 adult respondents in urban Ahmedabad. The study identifies key factors influencing consumer adoption, including health benefits, taste perception, price sensitivity, trust in product safety, and promotional influence, while analysing the role of demographic variables such as age, income, education, and health conditions. A quantitative descriptive research design was employed using a structured offline questionnaire, and data was analysed through descriptive statistics, frequency analysis, and the Chi-Square test. Findings reveal that while awareness is relatively high, regular usage remains moderate, indicating a gap between awareness and actual consumption. Health concerns and doctor recommendations emerged as the strongest drivers of adoption, while price sensitivity, taste dissatisfaction, and long-term safety concerns act as major barriers. The study concludes that wider acceptance requires improved taste profiles, transparent health communication, competitive pricing, and expanded retail availability.

Keywords: Consumer Awareness, Sugar Alternatives, Consumer Perception, Health Consciousness, Purchase Behaviour, Urban Ahmedabad.

INTRODUCTION

Rapid urbanisation, economic development, and lifestyle transitions in India have significantly transformed dietary habits, contributing to the

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rising prevalence of lifestyle-related diseases such as diabetes, obesity, and cardiovascular disorders. Refined sugar has emerged as a major dietary concern, making sugar reduction an important public health priority. This shift has led to growing interest in sugar alternatives, including natural sweeteners such as jaggery, honey, stevia, and coconut sugar, and artificial sweeteners like aspartame, sucralose, saccharin, and acesulfame-K, positioned as low-calorie or low-glycemic options for individuals managing health conditions or preventive goals.

Despite enhanced consumer exposure through supermarkets, pharmacies, health stores, and online platforms, consistent adoption remains uneven. Habitual consumption, taste preferences, affordability considerations, and long-term safety concerns continue to widen the gap between awareness and actual usage. Consumer perception is further shaped by price sensitivity, cultural food practices, trust in product safety, brand credibility, and doctor recommendations — particularly among individuals with diagnosed health conditions.

Ahmedabad offers a relevant and distinctive research context, combining traditional sweet food culture with a rapidly growing health-conscious population. The present study, “A Primary Study on Consumer Awareness, Perception, and Consumption Patterns of Sugar Alternatives Among Adults in Urban Ahmedabad,” aims to examine consumer perceptions, adoption motivators and barriers, and the influence of demographic and lifestyle factors on purchasing behaviour. The findings offer actionable insights for marketers, healthcare professionals, policymakers, and academic researchers.

MARKET ANALYSIS

India’s sugar alternatives market, valued at approximately ₹5,000 crores in 2023, is projected to grow at a CAGR of 6–8% through 2030, driven by rising health awareness, increasing prevalence of lifestyle-related diseases, and evolving urban consumption patterns. Growth is concentrated in urban and semi-urban areas where consumer exposure to preventive healthcare, nutritional education, and organised retail is higher.

Key market drivers include growing medical recommendations for diabetics and pre-diabetics, preventive healthcare trends, the rise of fitness and wellness culture, and urban lifestyle changes influenced by global food habits. The

market is broadly segmented into natural sweeteners — jaggery, honey, stevia, and coconut sugar, valued for traditional familiarity and perceived safety — and artificial sweeteners — aspartame, sucralose, saccharin, and acesulfame-K — which dominate packaged food and beverage applications due to affordability and availability, though they face a significant consumer trust deficit regarding long-term safety.

Leading market players include Zydus Wellness (Sugar Free) as the category leader in artificial sweeteners, Dabur India and Patanjali Ayurveda in the natural segment, and Cargill India in stevia-based B2B applications. Consumer behaviour reflects occasional rather than habitual use, shaped by taste satisfaction, price sensitivity, cultural affinity with refined sugar, and limited product knowledge. Ahmedabad’s market is particularly complex — combining deeply rooted sweet food traditions with a health-conscious, price-sensitive, and taste-driven consumer base, making it an ideal setting to study adoption barriers and motivators.

LITERATURE REVIEW

| <i>Sl No.</i> | <i>Year, Month and Issue</i> | <i>Title</i> | <i>Author</i> | <i>Aims</i> | <i>Findings</i> | <i>Research Gap</i> | <i>Industry</i> | <i>Paper Type</i> |
|---------------|------------------------------|--|------------------------|---|---|---|---------------------------|-------------------|
| 7 | 2010 | SSBs and Risk of Metabolic Syndrome & T2DM | Malik et al. | To evaluate the link between sugar-sweetened beverage consumption and the risk of diabetes and obesity. | Regular SSB intake is strongly linked to increased risk of obesity and type 2 diabetes. | Sugar Risks: Focuses on health risks of sugar, not consumer shift toward substitutes or behavioural insights in India. | Public Health & Nutrition | Review Paper |
| 1 | 2015 | Review of the Nutritional Benefits and Risks Related to Intense Sweeteners | Olivier Bruyère et al. | To evaluate the nutritional benefits and long-term health risks associated with intense sweeteners. | Short-term calorie reduction was observed, but long-term effects on obesity and diabetes were inconclusive. Consumers lack clear knowledge on dosage and health impact. | Health Focus (2015): Focuses only on clinical effects of artificial sweeteners. Lacks consumer awareness, behaviour, and Indian context. Ignores natural alternatives like jaggery and honey. | Nutrition & Health | Review Paper |
| 8 | 2016 | Nutrition Transition and Sugar-Free Shift | Popkin & Hawkes | To assess global dietary shifts toward processed and sugar-free foods during economic development. | Health awareness and income growth push consumers toward sugar-free alternatives. | Global Trends Discusses global sugar-free trends but lacks city-level insights and consumer decision factors in India. | Nutrition Economics | Trend Review |

| | | | | | | | | |
|----|------|--|--|---|--|--|----------------------------------|-------------------------|
| 6 | 2020 | Acceptance of Stevia as a Sugar Substitute Among Health-Educated Individuals | Afiq Mu'izzuddin Bin Saharudin et al. | To assess perception and acceptance of stevia among health-aware consumers. | High acceptance linked to health perception, though influenced by taste and price. | Limited Sample: Based on health-educated consumers in Malaysia. Not applicable to diverse Indian urban consumers or real purchase behaviour. | Nutrition Research | Primary Research |
| 2 | 2021 | Knowledge and Awareness of the Usage of Artificial Sweeteners | Indian Journal of Medical Research Review | To assess the level of awareness and typical usage of artificial sweeteners among Indian consumers. | Educated consumers in metros show moderate awareness, mostly for use in tea/coffee. Misinformation about health effects is common. | Awareness Only (2021): Covers awareness but ignores buying behaviour, price sensitivity, and loyalty. Excludes Ahmedabad and natural sweeteners. | FMCG / Food & Beverage | Research Paper |
| 9 | 2021 | Sugar-Free Drinks vs SSBs in China | Zhu et al. | To study substitution between sugary and sugar-free drinks. | High-income urban consumers shift to sugar-free drinks. | Beverage Study Limited to beverages in China. Ignores broader consumption, awareness, and cultural differences in India. | Beverages & Health | Empirical Study |
| 10 | 2022 | Replacement of Refined Sugar by Natural Sweeteners | ScienceDirect | To analyse the health impact of replacing refined sugar with natural alternatives. | Natural sweeteners reduce insulin spikes and support glycaemic control. | Nutritional Focus: Focuses on nutrition of natural sweeteners. Lacks consumer behaviour, pricing, and marketing insights in Indian context. | Nutrition & Health | Review |
| 3 | 2023 | Effect of Sugar Replacement with Stevia-Based Tabletop Sweetener | Clantha Research, Ahmedabad | To evaluate the impact of stevia on glycemic response in prediabetic individuals. | Stevia showed positive health outcomes and was generally accepted for taste and safety. | Stevia Clinical: Limited to glycemic impact of stevia in Ahmedabad. Ignores affordability, brand preference, and comparison with other alternatives. | Clinical Nutrition / Health Tech | Clinical Research Study |
| 4 | 2024 | Artificial Sweeteners and Their Implications in Diabetes: A Review | Angelin M., Kumar J., Vajravelu L.K., et al. | To review how artificial sweeteners affect glycaemic control and diabetes management. | Sweeteners like stevia, sucralose, and aspartame support blood sugar regulation but excessive use may alter gut health. | Clinical Review (2024) Focuses on health impacts, not consumer perception or usage patterns. Lacks Indian cultural context and natural substitutes. | Nutrition & Health | Review Paper |
| 5 | 2024 | Effect of Stevia on Blood Glucose and HbA1C: A Meta-Analysis | Various (ScienceDirect) | To evaluate the clinical impact of stevia on glycaemic markers. | Stevia significantly lowers blood sugar and HbA1C in diabetics and overweight individuals. | Stevia Meta Examines only physiological effects of stevia. No insights on taste, affordability, or consumer acceptance in India. | Health & Food Science | Meta-Analysis |

RESEARCH OBJECTIVES

1. To determine the demographic, health, and life style factors that drive adults in Ahmedabad to take up sugar alternatives.
2. To assess the influence of price, product availability, promotions, and brand loyalty on the selection of sugar alternatives.
3. To identify motivating factors influencing consumers' selection between natural and artificial sugar substitutes.

RESEARCH METHODOLOGY

This study adopts a descriptive and diagnostic research design to examine the factors influencing consumer awareness, perception, motivation, and buying behaviour related to sugar substitutes among adults in Ahmedabad city. As the study focuses on understanding consumer choices and purchasing behaviour, a quantitative primary research approach was adopted.

Primary data was collected entirely through structured offline surveys using printed questionnaires. The survey was personally conducted by the researcher in selected urban areas of Ahmedabad, mainly Vaishnodevi Circle, Thaltej, and nearby localities. These areas were selected due to their diverse residential and market environments, enabling access to respondents from varied demographic and socio-economic backgrounds.

Respondents were approached directly at residential societies, local markets, grocery stores, and pharmacies. The researcher personally explained the purpose of the study and clarified questions when required, ensuring accurate responses and complete questionnaires. Convenience sampling was used to include different consumer segments such as diabetics, health-conscious individuals, homemakers, and working professionals.

The questionnaire included multiple-choice questions, Likert scale items (1–5 rating), and choice-based questions covering awareness of sugar substitutes, health perceptions, trust levels, consumption frequency, preference for natural versus artificial sweeteners, pricing sensitivity, brand factors, and demographic characteristics such as gender, age, education, and income.

A total of 150 respondents participated in the survey. The collected data was organised and analysed using Microsoft Excel, applying descriptive techniques

such as percentages, frequency tables, and cross-tabulations. Bar charts and pie charts were used to present the findings clearly.

The study was conducted in urban Ahmedabad and focused on adult consumers who either directly consume sugar substitutes or influence household food purchasing decisions. To statistically test the hypotheses, the Chi-Square (χ^2) test was applied at a significance level of $\alpha = 0.05$, using the formula $\chi^2 = \sum (O - E)^2 / E$, where O represents the observed frequency and E represents the expected frequency.

DATA ANALYSIS AND INTERPRETATIONS

Respondent Information (For analysis purposes only; your identity will not be disclosed)

SECTION A: Respondent Profile

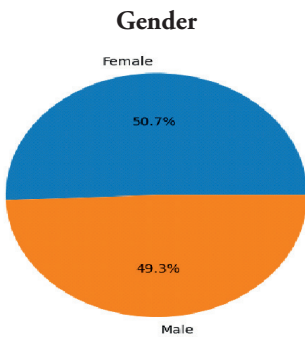


Fig. 1: Gender

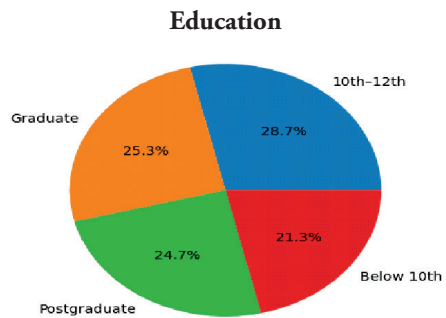


Fig. 2: Education

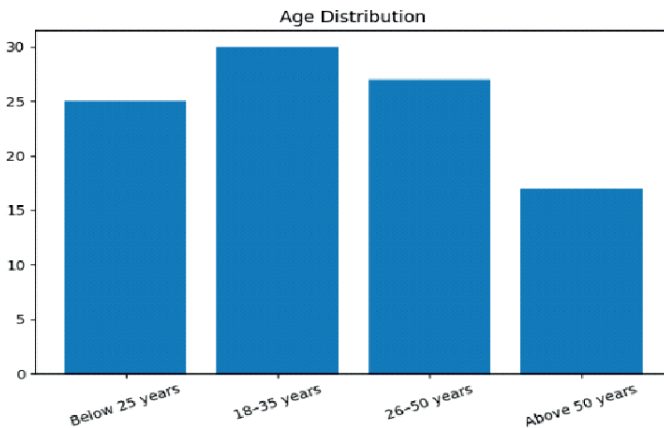


Fig. 3: Age Group

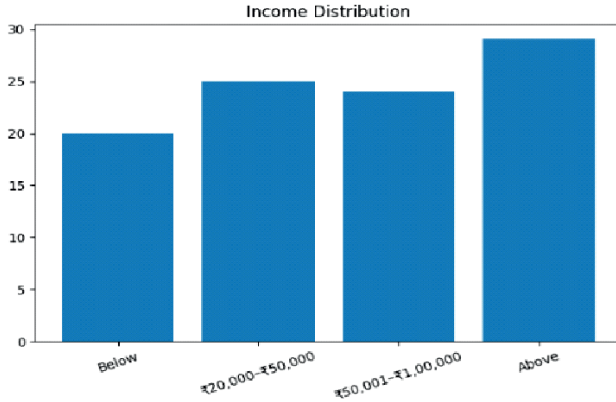


Fig. 4: Monthly Household Income

The sample reflects a balanced demographic distribution across gender, age, education, and income. The majority of respondents belong to the 26–35 age group (30.7%), with the highest income segment (above ₹1L) forming 29.33% of the sample — ensuring a diverse and representative cross-section of urban adult consumers in Ahmedabad

SECTION B: Sugar Consumption Patterns

Do you currently use regular white sugar in your daily diet?

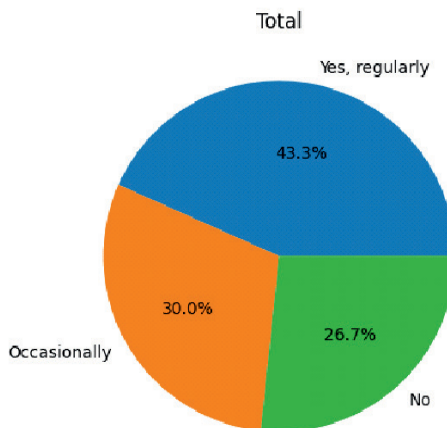


Fig. 5: Use sugar

What do you most often use sugar/sweeteners for?

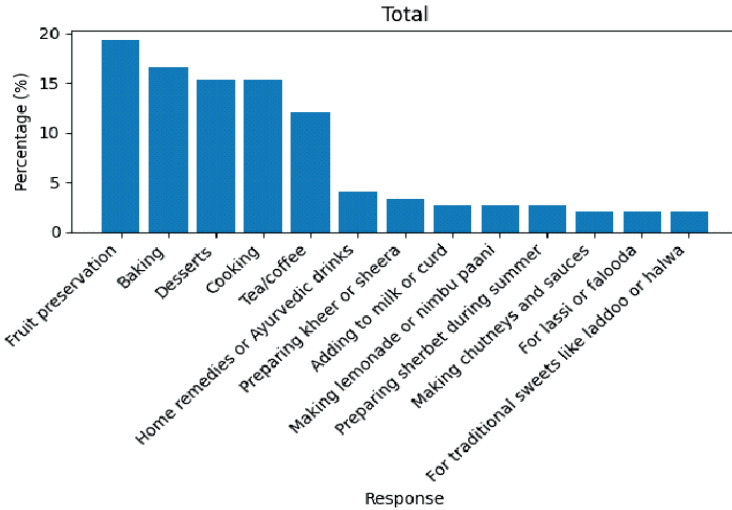


Fig. 6: Use Purpose

43.33% of respondents still use regular white sugar daily, indicating continued reliance on refined sugar in urban Ahmedabad. Sugar is widely used across multiple food activities — fruit preservation (19.33%), baking (16.67%), desserts and cooking (15.33% each) — reflecting its deeply embedded role in daily consumption habits.

SECTION C: Reasons for Limiting / Not Limiting Sugar

What are your reasons for limiting sugar?

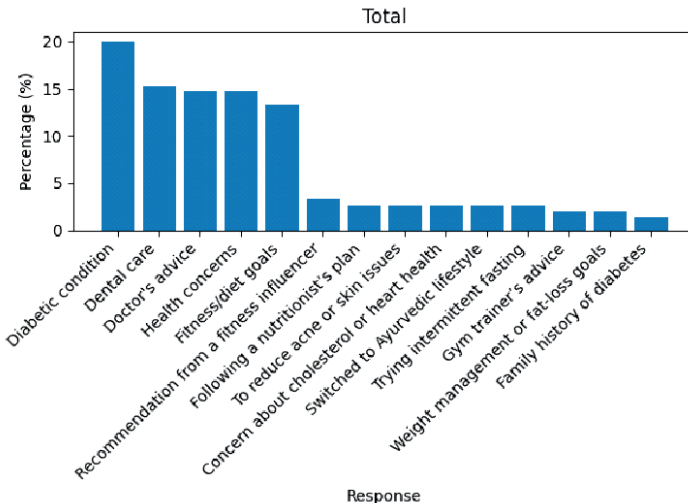


Fig. 7: Reason for Limiting Sugar

What are your reasons for NOT limiting sugar?

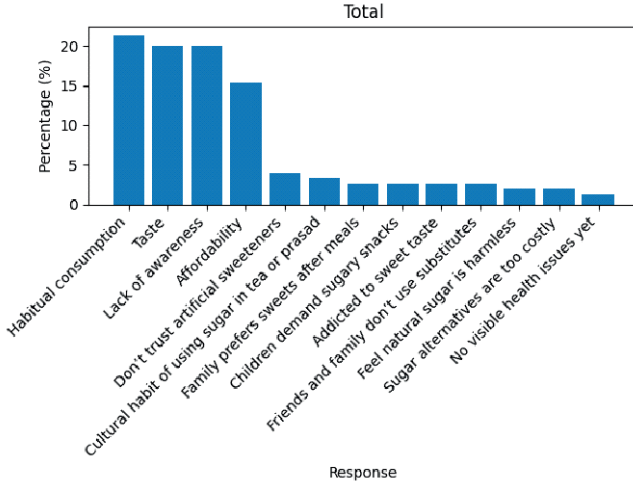


Fig. 8: Reason for NOT limiting sugar

Diabetic conditions (20%), dental care (15.3%), and doctor’s advice (14.7%) are the primary health-related motivators for reducing sugar, reflecting growing health consciousness among urban consumers. Conversely, habitual consumption (21.3%) and taste preference (20%) are the strongest barriers — highlighting that behavioural inertia and sensory attachment to refined sugar remain significant challenges to adoption.

SECTION D: Adoption of Sugar Alternatives

**Do you replace sugar? How long using?
How often used?**

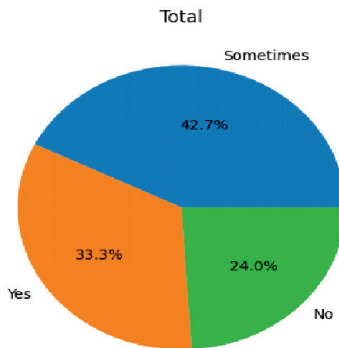


Fig. 9: Replacement with Alternatives

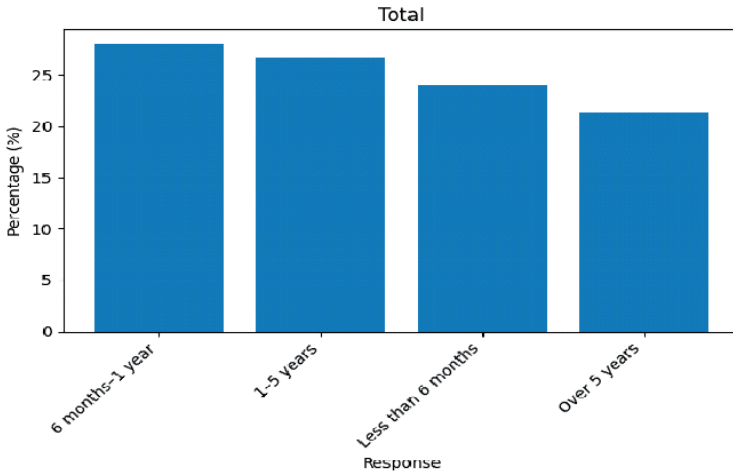


Fig. 10: Alternative Use

How often do you use sugar alternatives?

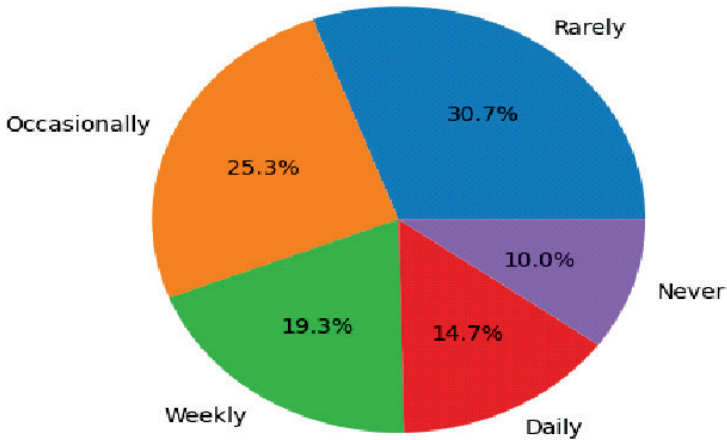


Fig. 11: Duration of use

While 42.7% sometimes replace sugar with alternatives, only 14.7% use them daily and 30.7% rarely use them — revealing a persistent gap between awareness and consistent adoption. Most respondents are relatively recent users (within 1 year), suggesting the category is still in an early adoption phase among urban consumers in Ahmedabad.

SECTION E: Motivators, Alternatives Used & Purchase Channels

What motivates use? Which alternative used?

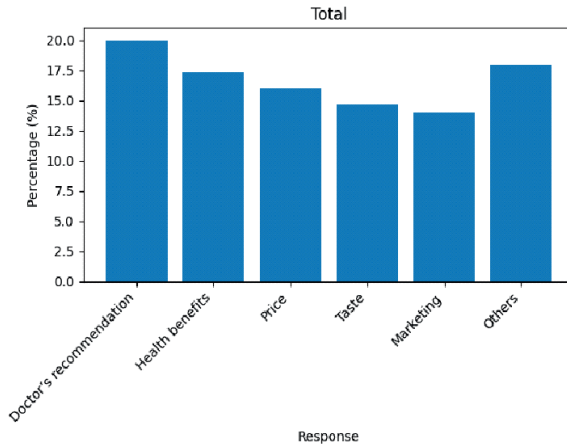


Fig. 12: Motivation

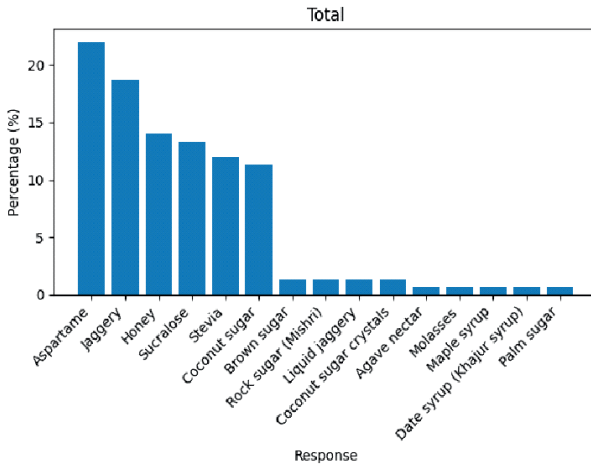


Fig. 13: Frequency of Use

Doctor's recommendation (20%) is the strongest motivator, followed by health benefits (17.3%) — confirming that medical advice drives trial more than marketing or price. Aspartame (22%) leads among alternatives used, though natural options such as jaggery (18.7%) and honey (14%) maintain strong presence. Pharmacies (26%) and health stores (22.7%) dominate purchase channels, reinforcing that sugar alternatives are primarily perceived as health products rather than everyday grocery items.

Where purchased?

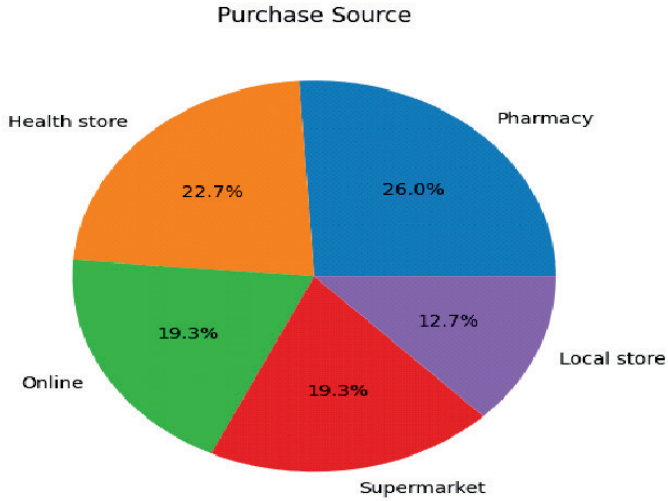


Fig. 14: Purchase Source

SECTION F: Price Sensitivity, Preference & Trust

Importance of price?

Importance of Price While Selecting Sugar Alternatives

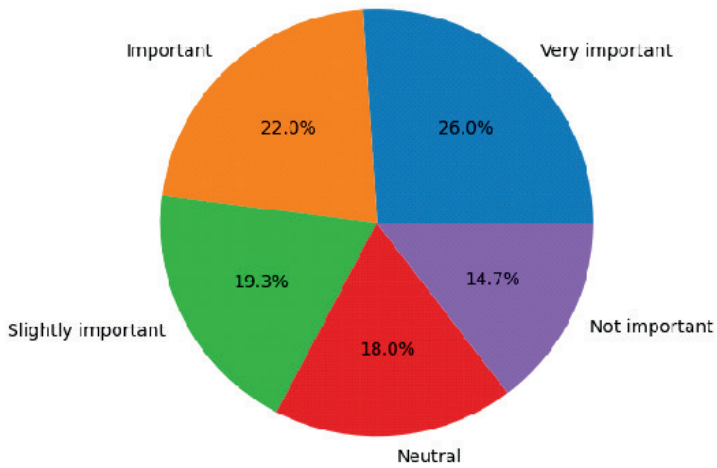


Fig. 15: Importance of price

Type of sweetener preferred?
Preference for Natural vs Artificial Sugar Substitutes

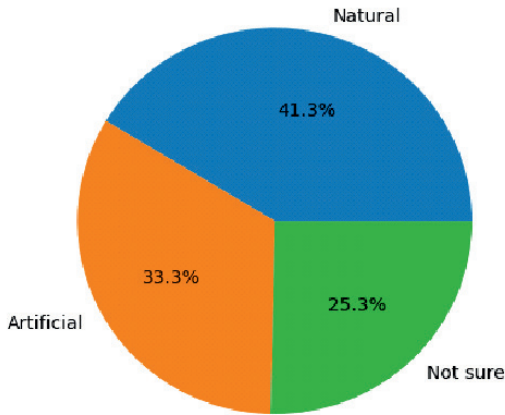


Fig. 16: Preference Type

Trust in safety & health?
Do you trust sugar substitutes to be safe and healthy?

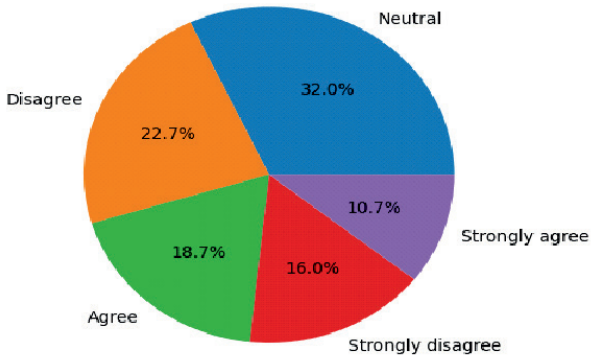


Fig. 17: Trust in Substitutes

48% of respondents consider price important or very important, indicating high price sensitivity in the sugar alternatives category. Natural sweeteners are preferred by 41.3% due to familiarity and perceived safety, while only 33.3% prefer artificial options. A significant trust deficit exists — 32% remain neutral on product safety and 38.7% disagree that substitutes are safe — representing a major barrier to wider adoption.

SECTION G: Taste Perception, Advertising Influence & Brand Loyalty

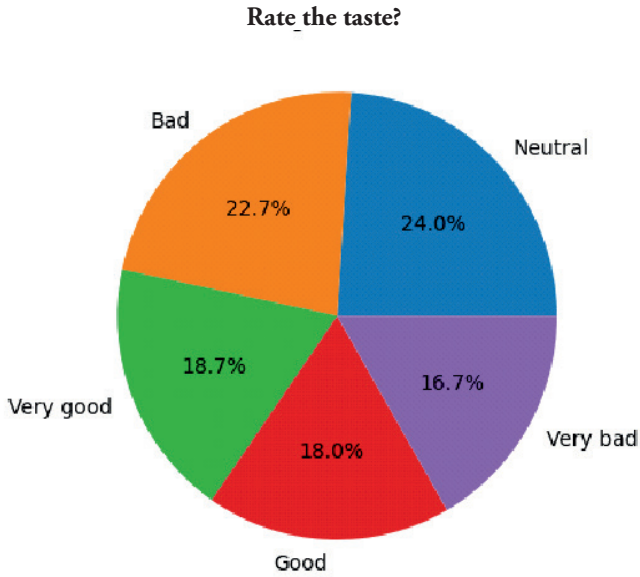


Fig. 18: Taste Ratings

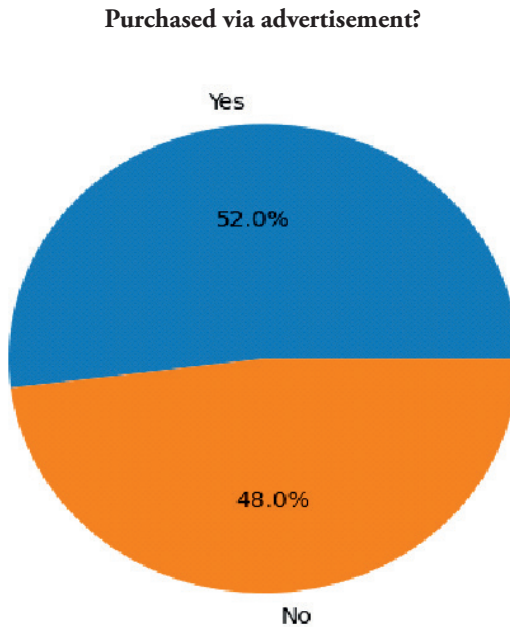


Fig. 19: Influence of Advertisement

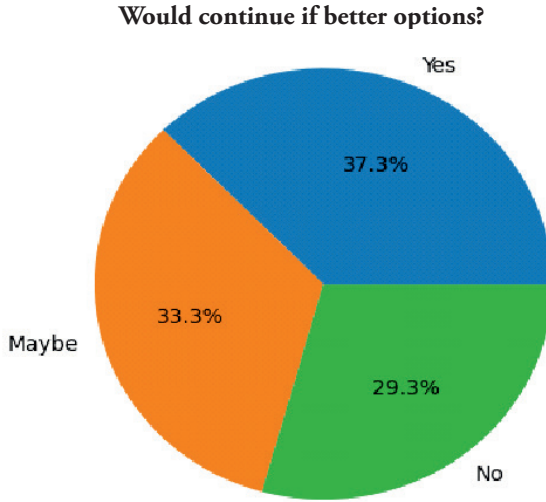


Fig. 20: Continue if Better Option

Taste ratings are mixed — 36.7% rate it positively (good/very good) while 39.4% rate it negatively (bad/very bad), confirming taste dissatisfaction as a key barrier. Advertisement influenced 52% to trial the product, though chi-square analysis confirms no statistically significant influence on final selection ($\chi^2 = 0.70$, $df = 2$, $p > 0.05$). Only 37.3% would continue using alternatives, reflecting conditional and cautious brand loyalty among urban consumers.

SECTION H: Consumer Perception & Promotion Outlook

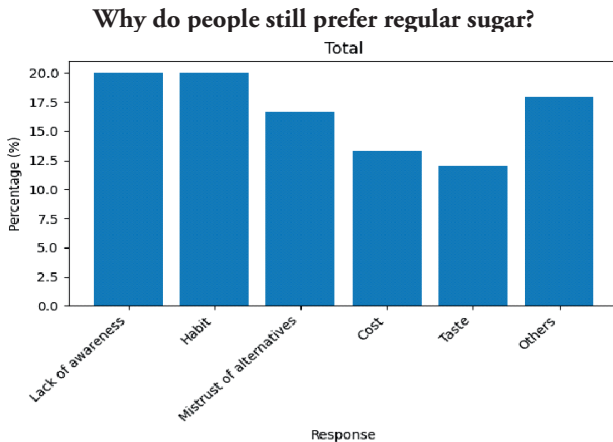


Fig. 21: Reason Others prefer sugar

Should sugar alternatives be promoted more widely in India?

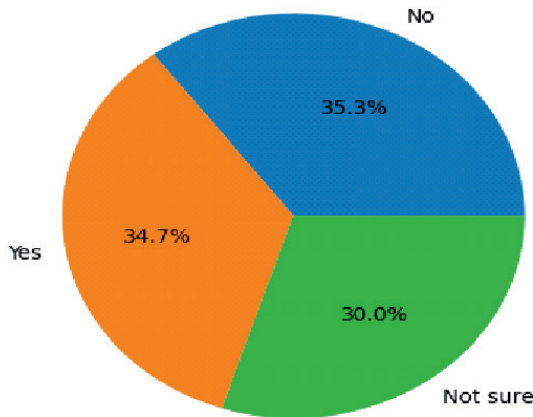


Fig. 22: Promotion Opinion

Habit (20%) and lack of awareness (20%) are the most cited reasons for continued preference of regular sugar, followed by mistrust (16.7%) in substitutes — highlighting behavioural resistance and limited consumer knowledge as the most significant barriers. Opinions on wider promotion remain divided (35.3% against, 34.7% for, 30% unsure), indicating the need for stronger consumer education and transparent health communication before broader promotional strategies can be effective.

HYPOTHESES AND NULL HYPOTHESES

- **Hypothesis 1 (H1):** Demographic characteristics, health conditions (such as diabetes), and lifestyle orientation (such as fitness consciousness) significantly influence the adoption of sugar alternatives among adults in urban Ahmedabad.
- **Hypothesis 2 (H2):** Price, product availability, promotional activities, and brand loyalty significantly influence consumers' selection of sugar alternatives.
- **Hypothesis 3 (H3):** Health awareness, taste preference, and price sensitivity significantly influence consumers' selection between natural and artificial sugar substitutes.

Hypothesis Testing (Chi-Square Test)

To test the hypotheses of the study, the Chi-Square (χ^2) test has been applied. The Chi-Square test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.

Hypothesis 1

H1: There is a significant relationship between demographic characteristics, health conditions (such as diabetes), lifestyle orientation (such as fitness consciousness), and the adoption of sugar alternatives among adults in Ahmedabad.

Table 1: Demographic Characteristics, Health Conditions & Lifestyle Orientation

| Factor / Category | Observed (O) | Expected (E) | $(O-E)^2 / E$ |
|------------------------------------|--------------|--------------|---------------|
| Age (Demographic) | 150 | 50.00 | 3.30 |
| Gender (Demographic) | 150 | 50.00 | 0.70 |
| Income (Demographic) | 150 | 50.00 | 8.28 |
| Health Conditions | 150 | 50.00 | 25.21 |
| Lifestyle Orientation | 150 | 50.00 | 68.17 |
| χ^2 (Total) | | | 105.66 |

$\chi^2 = 105.66$

Degrees of Freedom (df) = 102

Critical Value at 0.05 = 126.58s

Decision: Since χ^2 (105.66) < 126.58, the null hypothesis cannot be rejected.

Conclusion: Demographic characteristics, health conditions, and lifestyle orientation do not show a statistically significant influence on the adoption of sugar alternatives among adults in Ahmedabad. The null hypothesis (H01) is accepted at the 5% level of significance.

Hypothesis 2

H2: Price, product availability, promotional activities, and brand loyalty significantly influence consumers' selection of sugar alternatives.

Table 2: Price, Advertisement, Availability & Brand Loyalty

| Factor / Category | Observed (O) | Expected (E) | $(O-E)^2 / E$ |
|-------------------|--------------|--------------|---------------|
| Price | 150 | 50.00 | 9.83 |
| Advertisement | 150 | 50.00 | 0.70 |
| Availability | 150 | 50.00 | 5.29 |
| Brand Loyalty | 150 | 50.00 | 10.66 |
| χ^2 (Total) | | | 26.48 |

$$\chi^2 = 26.48$$

Degrees of Freedom (df) = 22

Critical Value at 0.05 = 33.92

Decision: Since χ^2 (26.48) < 33.92, the null hypothesis cannot be rejected.

Conclusion: When tested collectively, price, availability, promotional activities, and brand loyalty do not show a statistically significant combined influence on consumers' selection of sugar alternatives ($\chi^2 = 26.48 < 33.92$). The null hypothesis (H02) is accepted at the 5% level of significance. However, when tested individually, brand loyalty alone rejects the null hypothesis ($\chi^2 = 10.66 > \text{critical value } 9.49, df = 4, p = 0.031$), indicating that brand loyalty is a statistically significant individual factor influencing consumer selection, even though the combined hypothesis is accepted overall.

Hypothesis 3

H3: Health awareness, taste preference, and price sensitivity are significantly related to consumers' selection between natural and artificial sugar substitutes.

Table 3: Taste Preference, Price Sensitivity & Health Awareness

| Factor / Category | Observed (O) | Expected (E) | $(O-E)^2 / E$ |
|-------------------|--------------|--------------|---------------|
| Taste Preference | 150 | 30.00 | 5.83 |
| Price Sensitivity | 150 | 30.00 | 6.42 |
| Health Awareness | 150 | 10.71 | 21.20 |
| χ^2 (Total) | | | 33.45 |

$$\chi^2 = 33.45$$

Degrees of Freedom (df) = 42

Critical Value at 0.05 = 58.12

Decision: Since χ^2 (33.45) < 58.12, the null hypothesis cannot be rejected.

Conclusion: Health awareness, taste preference, and price sensitivity do not show a statistically significant relationship with consumers' selection between natural and artificial sugar substitutes. The null hypothesis (H03) is accepted at the 5% level of significance.

The Chi-Square (χ^2) test was selected as the statistical tool for hypothesis testing because the data collected in this study is categorical in nature — respondents chose from predefined categories such as age groups, income brackets, health conditions, lifestyle factors, and preference options. The Chi-Square test is the most appropriate non-parametric test to determine whether a statistically significant association exists between two or more categorical variables. Since the study aimed to examine relationships between demographic, health, and lifestyle factors and consumer adoption behaviour — rather than measuring means or continuous variables — the Chi-Square test provided the most suitable and reliable method of analysis. Additionally, with a sample size of 150 respondents and data analysed using frequency distributions and cross-tabulations, the Chi-Square test aligned perfectly with both the research design and the nature of the primary data collected.

DISCUSSIONS

The demographic profile of respondents is balanced but does not significantly influence adoption behaviour. The sample (n = 150) shows a near-equal gender split (50.7% female, 49.3% male), with the 26–35 age group being the largest (30.7%), followed by 36–50 years (26.7%), as seen in Fig. No. 1–4. However, chi-square analysis (Table 1; $\chi^2 = 105.66$, df = 102, p > 0.05) confirms that demographic factors are not significant determinants of adoption.

Regular sugar consumption remains dominant. Fig. 5 shows 43.33% of respondents consume white sugar daily, while Fig. 6 highlights its widespread use across fruit preservation, baking, and cooking, indicating strong habitual dependence. Health-related factors drive reduction, with diabetes (20%), dental care (15.3%), and doctor's advice (14.7%) as key reasons (Fig. 7). However, barriers such as habit (21.3%) and taste preference (20%) (Fig. 8) reflect behavioural inertia.

Adoption of sugar alternatives is largely occasional. Fig. 11 shows only 14.7% daily usage, with most using them sometimes (42.7%) or rarely (30.7%),

indicating early-stage adoption in urban Ahmedabad. Trial is primarily driven by doctor recommendations (20%) and health benefits (17.3%) (Fig. 12). Aspartame is the most used alternative (Fig. 13), while pharmacies (26%) and health stores (22.7%) dominate purchase channels (Fig. 14).

Although 48% consider price important (Fig. 15), chi-square results (Table 2; $\chi^2 = 26.48 < 33.92$) show that price, advertising, and availability are not statistically significant, whereas brand loyalty is ($\chi^2 = 10.66 > 9.49$, $p = 0.031$). Preference for natural sweeteners is evident (Fig. 16), but trust remains low, with neutrality and disagreement on safety (Fig. 17), though not statistically significant (Table 3; $\chi^2 = 33.45 < 58.12$).

Taste perception is a key barrier, with mixed responses (Fig. 18), explaining low daily usage. Advertising drives trial (52%) but not retention (Fig. 19–20), as only 37.3% continue usage. Finally, habit and lack of awareness (Fig. 21), along with divided opinions on promotion (Fig. 22), highlight the need for stronger consumer education alongside marketing efforts.

CONCLUSION

The present study examined consumer awareness, perception, and consumption patterns of sugar alternatives among adults in urban Ahmedabad. The findings indicate that demographic and health-related factors such as age distribution, diabetes concerns, medical advice, and preventive lifestyle choices influence consumers to limit sugar consumption and consider sugar alternatives. However, despite growing awareness, regular adoption remains limited as many consumers continue to rely on traditional sugar due to habitual consumption and taste preferences.

The study also highlights that price sensitivity, product availability, and promotional exposure significantly influence consumer purchasing behaviour. Sugar alternatives are most commonly purchased from pharmacies and health stores, suggesting that they are largely perceived as health-related products rather than everyday substitutes.

Furthermore, natural sweeteners such as jaggery and honey are preferred over artificial substitutes due to familiarity and perceived safety. Overall, the study suggests that while awareness of sugar alternatives is gradually increasing, consistent usage requires greater consumer education, improved taste acceptance, affordability, and stronger trust in product safety.

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