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Understanding Consumer Acceptance and Barriers to Alcohol-Free Wine: Insights Into Quality Perception and Purchase Motivations Across Demographics

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ABSTRACT

The global demand for nonalcoholic wine is growing significantly, driven by evolving consumer preferences, health-conscious trends, and religious considerations. This study evaluates consumers' ability to differentiate wine samples based on alcohol content (12%, 6%, and 0% v/v), perceptions of overall quality, and the motivations and barriers influencing the choice of alcohol-free wine across demographics (age, gender, and education). For this, a sensory evaluation was conducted using a ranking task, where consumers were randomly presented with the three wine samples and asked to rank them from highest to lowest alcohol content. Subsequently, participants rated the overall quality and reported the motivations and barriers influencing their choice of alcohol-free wine. A total of 59 participants (57.6% female and 42.4% male) took part in consumer acceptance testing and surveys. Sensory analysis revealed that 88.14% of participants correctly identified the original wine (OW), while 76.27% identified the partially dealcoholized wine (PDW) and the alcohol-free wine (DW). Overall quality scores significantly declined with decreasing alcohol content, with DW receiving the lowest score (4.2 ± 2.5), suggesting that ethanol concentration may influence flavor perception and overall sensory preference in the evaluated wines. Safety (52.5%), health or wellness benefits (44.1%), and the desire to avoid alcohol (37.3%) emerged as the primary motivations for consuming alcohol-free wine. In contrast, sensory shortcomings (64.4%), higher costs (25.4%), and limited availability (23.7%) were identified as key barriers to the adoption of alcohol-free wine. Furthermore, educational qualification (PhD > BSc > MSc) and age groups (younger: 18–35 years > older: above 35 years) significantly influenced the motivational factors "for social occasions without alcohol" ($\chi^2 = 8.20$, $p = 0.02$) and "health or wellness benefits" ($\chi^2 = 9.74$, $p = 0.04$), respectively. However, no statistically significant associations were found between demographic variables and key barriers.

1 | Introduction

The global market for nonalcoholic wine has exhibited significant growth, with an annual compound growth rate of 10.4% projected between 2024 and 2034. The industry is expected to expand from USD 2.7 billion in 2024 to an estimated USD 6.97 billion by the end of 2034 (Fact.MR 2024). This rapid growth is driven by consumer preferences influenced by evolving health consciousness, personal lifestyle choices, and religious considerations (Kumar, Cassano, et al. 2024; Kumar, Ricci, et al. 2024). Despite advancements in production technologies aimed at improving quality, nonalcoholic wines face several challenges that hinder widespread acceptance. A major barrier is consumer reluctance, often stemming from perceptions of inferior taste compared to traditional wines. A consumer perception and behavior study by Bucher et al. (2020) demonstrated that, although blind tastings revealed similar liking scores for standard and low-alcohol wines (12.5% vs. 8% ABV), consumers

Practical Applications

- The findings provide strategic insights to strengthen the positioning of alcohol-free wines in a competitive beverage market.
- Sensory results highlight shortcomings in flavor and aroma, guiding future research on improved dealcoholization methods and aroma retention strategies for the industry.
- Highlights consumer motivations and barriers, offering actionable directions for targeted marketing and product development.
- These findings, taken together, provide a framework to support product innovation, enhance consumer trust, and promote sustainable market expansion of alcohol-free wines.

exhibited pricing biases, being less willing to pay for low-alcohol wines compared to standard wines. Furthermore, purchase situation, wine expertise, brand (Petruzzellis et al. 2025), and chromatic symbolism (Bortolotti et al. 2024) also play a significant role in the wine experience. These effects are magnified in traditional wine cultures where vivid terroir imagery fundamentally shapes appreciation paradigms (Bortolotti et al. 2025). Additionally, pricing structures and adherence to specific religious guidelines, such as halal certification, remain significant barriers to market penetration (Day et al. 2024; Silva 2024).

Several studies have explored both the positive and negative aspects of wine consumption (Calvo-Porral et al. 2020; Klatsky 2010; Lombardo et al. 2023; Park 2004). Excessive alcohol consumption has negative consequences, leading to various social and health issues, including cardiovascular conditions such as cardiomyopathy, hypertension, coronary artery disease, and stroke (Deroover et al. 2021; Hay et al. 2023; Liu et al. 2025). On the other hand, moderate consumption has been linked to positive outcomes, such as reduced risks of neurodegenerative diseases and colon cancer, along with metabolic and cardioprotective benefits (Deroover et al. 2021; Shen et al. 2015). In a recent study, Liu et al. (2025) reported the effects of alcohol consumption on cardiovascular disease (CVD) risk. Moderate drinking was associated with a significantly lower risk (hazard ratio [HR] = 0.741, 95% confidence interval [CI] = 0.661–0.831, $p < 0.001$). Conversely, heavy drinking showed a small but statistically significant increase in risk (HR = 1.025, 95% CI = 1.004–1.095, $p = 0.035$). Further analysis using structural equation modeling highlighted the critical role of underlying social and health factors. The study found that nearly half (42.31%) of the apparent protective effect of moderate drinking could be attributed to favorable social determinants and better health metrics commonly linked with this drinking pattern. In contrast, the analysis revealed that the negative impact of heavy drinking is overwhelmingly driven (90.91%) by its association with poorer social determinants and worse health metrics. Similarly, O'Keefe et al. (2014) reported that moderate wine consumption, particularly when paired with meals, may offer potential health benefits. In addition, alcohol-free wines could provide a safer alternative for individuals such as pregnant women or those with medical conditions that necessitate avoiding alcohol (Okaru and Lachenmeier 2022). Notably, alcohol-free red wines rich in phenolic compounds could serve as a valuable source of antioxidants, potentially protecting against oxidative stress-related conditions, including cancer, diabetes, and Alzheimer's disease (Noguer et al. 2012).

With the growing focus on the health impacts of alcohol-free wine, researchers over the past few years have initiated an exploration into the distinctions in consumer behavior and perception regarding the consumption of no- and low-alcohol (NoLo) wine (Day et al. 2024; Naspetti et al. 2019; Shaw et al. 2023). Among the various factors influencing consumer choice, taste has been identified as a significant barrier to the adoption of low-alcohol wines. Saliba et al. (2013) found that only 16% of participants accepted low-alcohol wines; however, this acceptance rate increased to 40% when the taste was perceived to be similar to that of regular wine. On the other hand, Bucher et al. (2019) highlighted that the acceptability of low-alcohol wine, in addition to taste, is also influenced by factors such as price, cultural differences, marketing strategies, and labelling. Similarly, Filter and Pentz (2023) emphasized that "taste," "price," and prior experience (I have tried it before) are critical criteria for purchasing dealcoholized wines. Chan et al. (2012) conducted a study in Malaysia that examined consumer perception of dealcoholized wine among 100 Muslim and 100 non-Muslim participants. The results revealed that only 8.5% had consumed dealcoholized wine, and 22% were familiar with the product. Among those aware, 13% of Muslims and 32% of non-Muslims expressed a willingness to consume dealcoholized wine, provided it tasted and cost the same as regular wine. The study also identified several barriers to adoption: 42.5% of respondents rejected dealcoholized wine because it was not considered halal, 23% cited higher prices, 12% complained of poor mouthfeel, and 45.5% noted that most people were unfamiliar with the product. Furthermore, Stasi et al. (2014) conducted a consumer survey with 330 individuals in Apulia, Italy, at shopping malls, specialty stores, and supermarkets, and found that only 10% of respondents were willing to purchase dealcoholized wine. Also, a recent meta-analysis on expectancy–disconfirmation and consumer satisfaction by Schiebler et al. (2025) reported a positive correlation between performance expectations and consumer satisfaction ($r \approx 0.29$), with predictive expectations exerting the strongest influence. This underscores the pivotal role of aligning sensory delivery with consumer expectations to enhance product acceptability and satisfaction. These findings point to the necessity of understanding whether consumers can distinguish wine based on alcohol content and their overall perceptions of the quality of dealcoholized wines. The current study aims to explore/at exploring whether consumers can differentiate wines based on alcohol content and their perceptions of overall quality. Furthermore, the study examines the key barriers and factors influencing the adoption of alcohol-free wines from the consumer's perspective.

2 | Materials and Methods

2.1 | Wine Samples

For this study, commercially available Pinot Grigio wine with 12% v/v alcohol (OW) and an alcohol-free/No-Low (DW) version (0.0% v/v) were used. To prepare a partially dealcoholized wine (PDW) sample with 6% v/v alcohol, equal volumes of the 12% v/v and 0.0%

v/v wines were blended in a 1:1 ratio. However, the PDW sample was intentionally prepared by blending to obtain 6% v/v ethanol in order to increase the variability in ethanol content across samples. Three bottles were prepared for each wine sample (as shown in Figure 1) and stored at 14°C for subsequent analysis.

2.2 | Survey Location

The survey was conducted at the Department of Agricultural and Food Sciences, University of Bologna, located at Piazza Goidanich 60, 47,521 Cesena, Italy. Participants included bachelor's, master's, and PhD students, as well as researchers, with expertise in food science, viticulture, and enology. Panelists were recruited from within the department because it was easier to find participants who were ready to take part in both the sensory evaluation and the surveys. Their background ensured a basic understanding of sensory evaluation practices and wine-related attributes, facilitating more consistent and informed responses. Moreover, only individuals who reported consuming wine at least once per week were included to guarantee a minimum level of product familiarity. The sample size ($n = 59$) was due to the in-person nature of the sensory evaluation, which required controlled tasting conditions and limited the feasibility of recruiting a larger panel compared to online surveys.

2.3 | Procedure and Questionnaire Design

The survey on consumer preferences was conducted from November 11 to 18, 2024, using a questionnaire constructed and designed based on previous literature (Bruwer et al. 2014; Bucher et al. 2020; Chan et al. 2012; Saliba et al. 2013) (see Table S1), which included 10 structured questions. The first four questions focused on demographic information, including age group, gender, country of residence, and educational qualification, to contextualize preferences across diverse backgrounds.

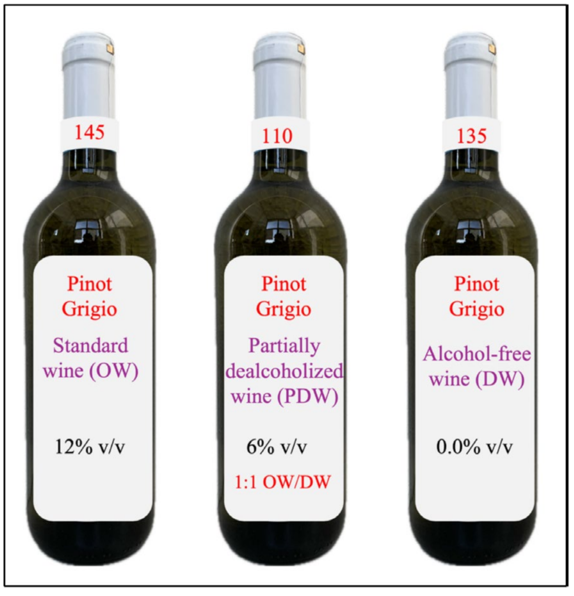

FIGURE 1 | Experimental design for the different wine samples used in the study.

Subsequent questions were designed to investigate consumer preferences, perceptions, and potential barriers to purchasing alcohol-free wine. In Question 5, participants were asked to rank a set of three wine samples ("alcohol free," "partially dealcoholized," and "original wine") based on alcohol concentration, thus investigating their ability to discriminate alcohol levels; they were presented in a randomized order, three-digit coded, in small disposable plastic glasses containing 20–25 mL of wine. Natural water was provided during tasting to neutralize the effects of the previous samples. The next question (Q6) assessed participants' satisfaction with each sample's overall quality on a 10-point scale, where 1 = "Very Dissatisfied" and 10 = "Very Satisfied" (Ma and Sam 2024).

Furthermore, to understand the motivations for choosing alcohol-free wine, Q7 provided participants with a selection of possible reasons, including health benefits, calorie reduction, social considerations etc. In contrast, Q9 examined deterrents to purchasing alcohol-free wine, with options like limited availability, unsatisfactory taste, and lack of compliance with halal standards. Participants were also asked for their perspective about alcohol-free wine is attractive for individuals who abstain from alcohol for religious, cultural, or health reasons (Q8), with response options of "yes," "no," or "not sure." Finally, an open-ended section (Q10) allowed respondents to provide additional comments or feedback, offering insights into unique preferences or concerns.

2.3.1 | Ethical Compliance

This study was conducted in accordance with the ethical standards laid down in the Declaration of Helsinki or comparable ethical guidelines. Participants provided informed consent verbally by stating, "I voluntarily agree to participate in this sensory evaluation and survey and consent to the anonymous use of my responses for research and publication purposes." They were informed that participation was voluntary and that they could withdraw from the study at any time without providing a reason. Participants were also informed that the wine samples included partially dealcoholized (PDW, 6% v/v ethanol) and dealcoholized/alcohol-free (DW, 0% v/v ethanol) white wines, which they were required to taste. A specific ethical approval for conducting a human sensory study was not required, as this study was carried out.

2.4 | Statistical Analysis

Statistical analysis was performed using XLSTAT 2020 software (Addinsoft, USA). The normality of the overall quality score data was assessed prior to analysis. A one-way ANOVA was applied to the overall quality scores of the wine across demographic groups, and post hoc pairwise comparisons were conducted using Tukey's HSD test for multiple comparisons. Chi-square tests were used to analyze significant differences in demographic characteristics concerning the motivations of wine consumers to buy lower-alcohol wines and the key barriers to the acceptance of alcohol-free wines. Additionally, correspondence analysis was conducted to explore patterns and relationships between demographic groups and the motivational factors or key barriers influencing alcohol-free wine consumption. All statistical analyses were conducted at a 95% significance level ($p \leq 0.05$). The survey data were collected in Google Forms (https://forms.gle/KMmpqcy921p3fyo69).

3 | Results and Discussion

3.1 | Demographic Overview

The study involved 59 participants (Table 1), selected as frequent wine drinkers (consuming wine at least once a week), with a balanced demographic profile aimed at consumer acceptance testing and surveys comprising 57.6% females and 42.4% males, with no participants opting for "prefer not to say." The majority were young adults, with 81.4% falling between the ages of 18 and 34 years, including 33.9% in the 18–24 age group and 47.5% in the 25–34 range. Participants had different grade levels, with 42.4% holding a PhD, 37.3% a Bachelor's degree, and 20.3% a Master's degree. Most respondents (89.8%) were from Italy, with a small proportion from Brazil (3.4%) and others (6.8%) from Chile, Iran, Spain, and Russia; while predominantly Italy-based, this sample offers preliminary insights into consumer preferences across a limited range of cultural backgrounds.

3.2 | Wine Evaluation

Table 2 presents the results of consumer perception of different wine samples based on ethanol content. The results reveal that OW was correctly identified as OW by 88.14% of participants, with 6.78% misclassifying it as PDW and 5.08% as DW. Similarly, PDW was accurately identified by 76.27% of participants, while 8.47% perceived it as OW and 15.25% as DW. For DW, 76.27% of participants correctly identified it as alcohol-free, whereas 16.95% perceived it as PDW and 6.78% as OW. Based on gender, 94%, 79%, and 82% of female participants correctly identified the OW, PDW, and DW wine samples, respectively, whereas 88%, 68%, and 72% of male participants correctly identified these samples (data are not shown). Table 3 shows the average overall quality scores of three different white wines evaluated by consumers ($n = 59$) across various age groups, genders, and education levels. The findings show a significant decrease in overall quality score as alcohol content decreases. Across all age groups, OW consistently scored the highest, suggesting that consumers strongly favor OWs with full alcohol levels. Although PDW was frequently scored somewhat lower than OW, most groups' scores did not differ statistically (e.g., 18–24 years: OW 6.6 ± 2.1, 95% CI = 5.8–7.4 vs. PDW 6.0 ± 1.3, 95% CI = 5.2–6.8, $\eta^2 = 0.44$), indicating that partial dealcoholization might preserve acceptable sensory qualities. However, as compared to the other categories, DW consistently got the lowest ratings, indicating a substantial decline in customer satisfaction with alcohol-free wine ($p < 0.05$). The younger individuals (18–24 years old) exhibited the sharpest decline in DW liking (3.0 ± 1.8) among age groups, whereas older participants (45 years and above) showed a more modest fall in quality score.

Gender-based analysis revealed slight variations: female participants scored OW at 6.3 ± 2.1 (95% CI = 5.6–7.1) and PDW at 6.0 ± 1.7 (95% CI = 5.2–6.7, $\eta^2 = 0.12$), although there was no statistically significant difference between the two. However, their scores for DW dropped significantly to 4.5 ± 2.5 ($p \leq 0.05$). Male participants showed a similar pattern; however, females gave DW a higher rating (4.5 ± 2.5) than males (3.8 ± 2.4).

Evaluations of quality were also influenced by educational background. MSc level participants were given a higher score for DW (5.3 ± 2.7, 95% CI = 4.0–6.5), suggesting a higher tolerance for dealcoholized wines. However, there was no statistically significant difference ($p \leq 0.05$) in the ratings of the wine samples in this group ($\eta^2 = 0.03$), which were all evaluated similarly. However, those with a BSc or PhD degree observed a significant decline in their overall quality scores as the ethanol content decreased. Overall, OW achieves the highest average overall quality score (6.6 ± 2.0, 95% CI = 6.1–7.1), reflecting its full-bodied flavor, aromatic complexity, and balanced structure. PDW maintains a moderate score (5.9 ± 1.6, 95% CI = 5.4–6.4), indicating partial retention of sensory attributes despite some compromise (sensory change) during/following dealcoholization. In contrast, DW receives the lowest quality score (4.2 ± 2.5, 95% CI = 3.7–4.7, $p \leq 0.05$, $\eta^2 = 0.21$), likely due to the absence of ethanol, which plays a key role in flavor perception, mouthfeel, and aroma integration. Similarly, King and Heymann (2014) observed a lower average likelihood

TABLE 1 | Demographic overview of consumers ($n = 59$) who participated in the consumer acceptance testing and consumer survey.

Variable	Category	Response (n)	%
Gender	Male	25	42.4
	Female	34	57.6
	Prefer not to say	0	0
Age (years)	18–24	20	33.9
	25–34	28	47.5
	35–44	7	11.9
	45–54	2	3.4
	≥ 55	2	3.4
Education	Bachelor's degree (BSc)	22	37.3
	Master's degree (MSc)	12	20.3
	PhD	25	42.4
Country	Italy	53	89.8
	Brazil	2	3.4
	Chile	1	1.7
	Iran	1	1.7
	Spain	1	1.7
	Russia	1	1.7

TABLE 2 | Consumer perception of different wine samples based on ethanol content.

Wine sample	Perceived as OW	Perceived as PDW	Perceived as DW
OW	52 (88.14%)	4 (6.78%)	3 (5.08%)
PDW	5 (8.47%)	45 (76.27%)	9 (15.25%)
DW	4 (6.78%)	10 (16.95%)	45 (76.27%)

TABLE 3 | Average overall quality scores of three different types of white wine evaluated by consumers ($n = 59$) across different age groups, gender, education, and overall.

Demographic groups	OW	95% CI (OW)	PDW	95% CI (PDW)	DW	95% CI (DW)	Effect size (eta^2 [η^2])
Age: 18–24 ($n = 20$)	6.6 ± 2.1^{a}	5.8–7.4	6.0 ± 1.3^{a}	5.2–6.8	3.0 ± 1.8^{b}	2.1–3.8	0.44
25–34 ($n = 28$)	6.6 ± 1.9^{a}	5.8–7.3	6.0 ± 1.7^{ab}	5.2–6.7	5.1 ± 2.3^{b}	4.4–5.8	0.09
35–44 ($n = 7$)	6.1 ± 2.5^{a}	4.5–7.8	5.6 ± 1.4^{a}	3.9–7.2	3.7 ± 2.3^{ab}	1.5–4.8	0.32
45–54 ($n = 2$)	6.5 ± 1.5^{a}	0.5–12.5	4.5 ± 1.5^{a}	−1.5-10.5	4.5 ± 2.5^{a}	−1.5–10.5	0.20
55 and above ($n = 2$)	6.5 ± 1.5^{a}	1.1–13.9	5.0 ± 1.0^{a}	−1.4-11.4	4.0 ± 3.0^{a}	−2.4–10.4	0.35
Female ($n = 34$)	6.3 ± 2.1^{a}	5.6–7.1	6.0 ± 1.7^{a}	5.2–6.7	4.5 ± 2.5^{b}	3.8–5.3	0.12
Male ($n = 25$)	6.9 ± 1.8^{a}	6.1–7.7	5.7 ± 1.4^{a}	4.9–6.5	3.8 ± 2.4^{b}	3.0–4.5	0.31
BSc ($n = 22$)	6.8 ± 2.1^{a}	6.0–7.6	5.9 ± 1.3^{a}	5.1–6.7	3.3 ± 2.0^{b}	2.5–4.1	0.41
MSc ($n = 12$)	6.1 ± 2.1^{a}	4.8–7.3	5.8 ± 1.3^{a}	4.6–7.1	5.3 ± 2.7^{a}	4.0–6.5	0.03
PhD ($n = 25$)	6.6 ± 2.0^{a}	5.7–7.4	5.8 ± 1.9^{ab}	5.0–6.7	4.5 ± 2.6^{b}	3.6–5.4	0.13
Average overall quality ($n = 59$)	6.6 ± 2.0^{a}	6.1–7.1	5.9 ± 1.6^{a}	5.4–6.4	4.2 ± 2.5^{b}	3.7–4.7	0.21

Note: Different letters indicate statistically significant differences (one-way ANOVA) at the level of $p < 0.05$ by Tukey test.

score for reduced-alcohol Chardonnay white wine (4.4 ± 2.7) compared to regular Chardonnay white wine (7.1 ± 2.2) in the \$10–\$15 price range.

3.3 | Consumer Motivations to Buy Alcohol Free Wine

In order to explore the reasons that drive purchase or consumption of alcohol-free wine over alcoholic wine, consumers were asked the question, "Q7. What are the main reasons you might choose alcohol-free wine…?" The aggregated responses with demographic-specific insights based on age, gender, and educational qualifications are presented in Figure 2. The results demonstrate that the most frequently cited reason for choosing alcohol-free wine was "safety reasons (e.g., driving)," prioritized by 52.5% of respondents. This factor was particularly important among females (33.9%), younger age groups (18–24: 23.7% and 25–34: 22.0%), and participants with a BSc qualification (25.4%). Following this, "health or wellness benefits" emerged as a significant driver, cited by 44.1% of respondents. Females again demonstrated a stronger inclination toward this motivation (30.5%) compared to males (13.6%), with the 25–34 age group (28.8%) and PhD participants (22%) being the most prominent demographics. The "desire to avoid alcohol" was another major factor, reported by 37.3% of participants, with females leading this preference (23.7%), and this motivation was most prevalent among MSc-level participants (13.6%) and the 25–34 age group (20.3%).

Social contexts, such as choosing alcohol-free wine "for social occasions without alcohol" (e.g., professional settings or family-oriented events), were significant for 32.2% of respondents, with females (22.0%) showing a stronger preference than males (10.2%). Younger consumers, particularly those aged 18–24 (10.2%) and 25–34 (15.3%), were most likely to select this option. MSc-level participants were the most prominent in this category, followed by PhD and BSc participants. The desire for "lower calorie content" influenced 28.8% of the respondents, with females again showing a higher preference (16.9%) than males (11.9%), particularly within the 25–34 age group (18.6%) and BSc level participants (13.6%). Finally, only 11.9% of participants reported selecting alcohol-free wine because it "tastes almost similar to wine," with marginal differences across demographic groups.

Furthermore, a chi-square test was performed to investigate differences in motivational factors influencing alcohol-free wine consumption across various demographic groups (Table 4). The results revealed significant associations at the 95% confidence level among age groups regarding the factor "health or wellness benefits" ($\chi^2 = 9.74$, $p = 0.04$). Gender did not show significant differences for any motivational factors ($p > 0.05$). On the other hand, educational qualification significantly influenced "for social occasions without alcohol" ($\chi^2 = 8.20$, $p = 0.02$). Further, the motivational factors with demographic groups were evaluated using correspondence analysis, as shown in Figure 3a, explaining 71.5% of the total variability (F1 = 42.99% and F2 = 28.50%). The biplot shows that motivations such as "for social occasions without alcohol" are mainly associated with females, age 45–54, and MSc degree holders. On the other hand, the upper-left quadrant emphasizes "health or wellness benefits" are associated with PhD holders and age 25–34. This suggests that younger people with higher educational qualifications prefer the alleged health benefits of alcohol-free wine. Motivations such as "desire to avoid alcohol" and "safety reasons (e.g., driving)" are connected with younger participants (18–24) and those with a BSc degree. Male and those over 55 are more likely to agree with "Lower calorie content" and "Tastes almost similar to wine," which indicate distinct tastes.

Similarly, Saliba et al. (2013) conducted a consumer survey on low-alcohol wine among 844 adult wine consumers in

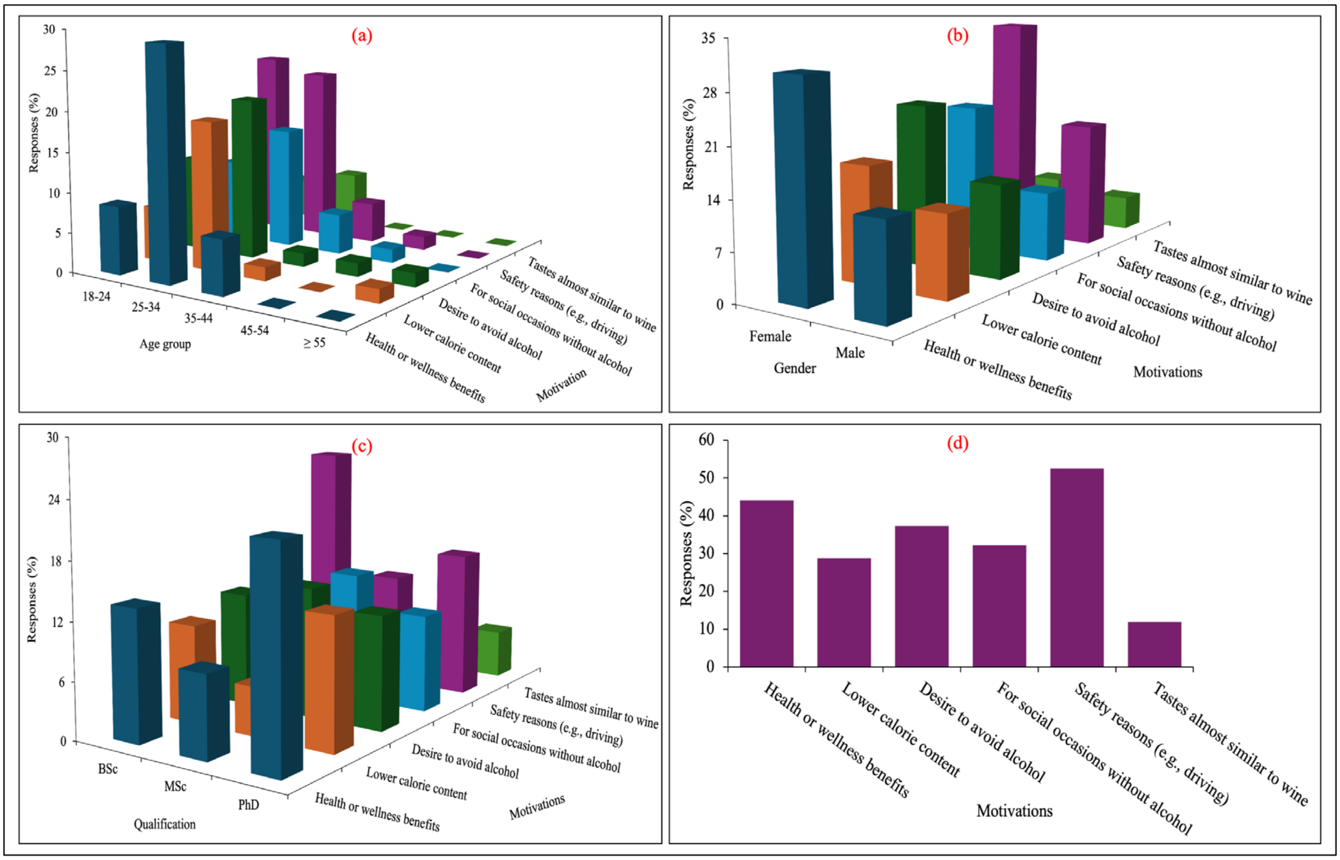

FIGURE 2 | The motivation/reasons in which individuals may prefer to purchase or consume alcohol-free wine over alcoholic wine across different age groups (a), gender (b), qualifications (c), and overall response (d).

TABLE 4 | Motivational factors influencing alcohol-free wine consumption across demographic groups.

Motivation to consume alcohol-free wine	Age group		Gender		Education	
	χ^2	p	χ^2	p	χ^2	p
Health or wellness benefits	9.74	0.04	1.15	0.28	1.19	0.55
Lower calorie content	4.22	0.38	0.22	0.64	0.23	0.89
Desire to avoid alcohol	2.27	0.69	1.60	0.21	5.63	0.06
For social occasions without alcohol	1.64	0.80	1.33	0.25	8.20	0.02
Safety reasons (e.g., driving)	5.35	0.16	1.27	0.26	5.06	0.08
Tastes almost similar to wine	1.82	0.77	0.62	0.43	0.21	0.90

Note: Chi-square test was conducted at a 95% significance level ($p < 0.05$).

Australia. The results revealed that 322 participants (38%) expressed no interest in low-alcohol wine, selecting the option "I am not interested in low-alcohol wine." Among the remaining 522 participants, interest in low-alcohol wine was driven by various factors, such as "driving" (19%), "health benefits" (16%), "reduced effects of alcohol" (16%), "lower alcohol consumption while still enjoying wine" (12%), and "ability to drink more without experiencing the effects of alcohol" (11%). Additionally, approximately 10% of participants identified other reasons for their interest, including enjoyment of the wine's taste without alcohol, perception of alcohol as unnecessary, potential safety benefits, and cost considerations.

A recent study by Day et al. (2024) investigated Australian consumer perceptions of nonalcoholic white and red wines. The results revealed varying levels of satisfaction based on prior experiences with nonalcoholic white wines (242 total respondents) and red wines (109 total respondents). For nonalcoholic white wine, 42.6% of participants reported that their experiences "met expectations," while 21.4% and 6.2% stated their expectations were "exceeded" or "far exceeded," respectively. Conversely, 24% and 5.8% found their experiences "short of expectations" or "far short of expectations," respectively. In comparison, nonalcoholic red wine demonstrated slightly less favorable consumer responses. Only 34.9% of participants indicated that their experiences "met expectations," with 18.3% and 7.3% reporting "exceeded expectations" and "far exceeded expectations," respectively. Notably, 25.7% felt their experience "short of expectations," and 13.8% considered it "far short of expectations." Furthermore, willingness to try and motivation toward nonalcoholic beverages were assessed, with a total of 410 respondents participating. Respondents chose a variety of reasons

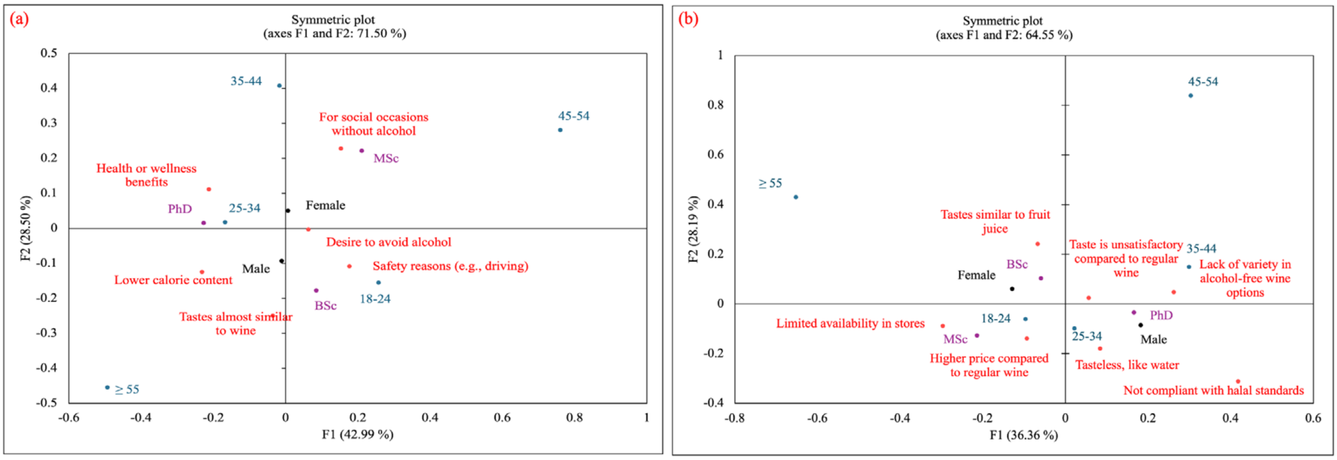

FIGURE 3 | Correspondence analysis. (a) Motivational factors influencing alcohol-free wine consumption across demographic groups. (b) Key barriers to the acceptance of alcohol-free wine across demographic groups.

for their willingness to try nonalcoholic beverages, including "health" (41.5%), "consuming less alcohol" (39.2%), "drinking and driving" (38.6%), and "avoiding alcohol-related negative effects" (32.3%). "Religious" reasons accounted for only 1.8% of responses.

Piatkowski et al. (2024) conducted a global survey to assess consumer perceptions of NoLo beverages, utilizing data from the 2022 Global Drug Survey. The study analyzed responses from 20,473 participants regarding their consumption habits over the past 12 months. Among them, 45.9% reported consuming low-alcohol products (≤1.2% v/v), while 54.1% did not. Similarly, 47.8% of respondents consumed dealcoholized products (≤0.5% v/v), compared to 52.2% who abstained. Meanwhile, 31.7% reported consuming alcohol-free products (≤0.05% v/v), whereas 68.3% did not. Participants were also asked about their motivations for choosing NoLo beverages, with responses gathered from 14,560 individuals. The most commonly cited reason was "avoid getting drunk" (51.5%), followed by "staying safe while driving" (43.7%) and "like the taste of NoLo products" (35.8%). Other prominent motivations included prioritizing "mental/physical health" (31.6%), "trying to drink less" (20.2%), and "consume fewer calories" (16.3%). Less frequently mentioned reasons included "fit in better with the drinking of others" (8.9%), "avoid self-embarrassment (while drunk)" (8.7%), "avoid interactions with other drugs" (7.4%), and "pregnancy-related considerations" (3.1%). Social influences, such as "encouragement from friends or family" (2.8%) or the perception of NoLo products as "trendy/fashionable" (1.5%), were rarely reported. Additionally, 14.9% of participants selected "Other" as their reason for consuming NoLo beverages.

The difference in the results of the current study with previous findings is due to methodological heterogeneity, demographic and cultural variables, technological evolution in production, temporal shifts in health messaging, and regulatory frameworks. Methodologically, question framing diverged significantly: the current study's prompt (main reasons you might choose alcohol-free wine) emphasized proactive motivations, whereas Saliba et al. (2013) assessed "interest" as one option among many, diluting prioritization of factors like driving safety (19% vs. 52.5%). Demographically, sample composition skewed toward younger, educated females in the current study a cohort underrepresented in Piatkowski et al. (2024), which included polysubstance users and older males, explaining lower social motivation (8.9% vs. 32.2%). Regionally, stricter drunk-driving laws in Europe (e.g., Germany's leadership in dealcoholized wines) amplified safety motivations relative to Australian studies. Critically, technological advancements since 2013 (e.g., spinning cone columns and reverse osmosis) improved sensory profiles, elevating taste acceptance in recent studies (35.8% in Piatkowski vs. 11.9% in the current study). Temporal health messaging shifts also contributed: post-2023 WHO declarations linking any alcohol to cancer heightened health motivations (>40% in 2024 studies vs. 16% in Saliba et al.).

Further, in response to Q8, "Do you think alcohol-free wine is attractive for individuals who abstain from alcohol for religious, cultural, or health reasons?" 76.3% of participants chose "Yes," 22% selected "Maybe," and only 1.7% opted for "No." This indicates that consumers largely recognize the potential benefits of alcohol-free wine.

3.4 | Barriers to Acceptance of Alcohol-Free Wine

The acceptance of alcohol-free wine, compared to regular alcoholic wine, is hindered by several barriers across demographic groups (age, gender, and educational levels) (Figure 4). However, the most significant issue was related to sensory shortcomings. The "unsatisfactory taste compared to regular wine" was cited by the majority of respondents (64.4%), highlighting the need to improve the flavor profile for market expansion. The issue was more prevalent among individuals with a PhD (28.8%) and those aged 25–34 years (27.1%), and it was significantly higher among females (37.3%) than males (27.1%). Additionally, 32.2% of consumers noted that alcohol-free wine "tastes similar to fruit juice," further highlighting dissatisfaction with its sensory attributes. This issue was especially notable among females (20.3%), younger age groups (13.6% in the 18–24 age group), and participants with a BSc qualification (16.9%).

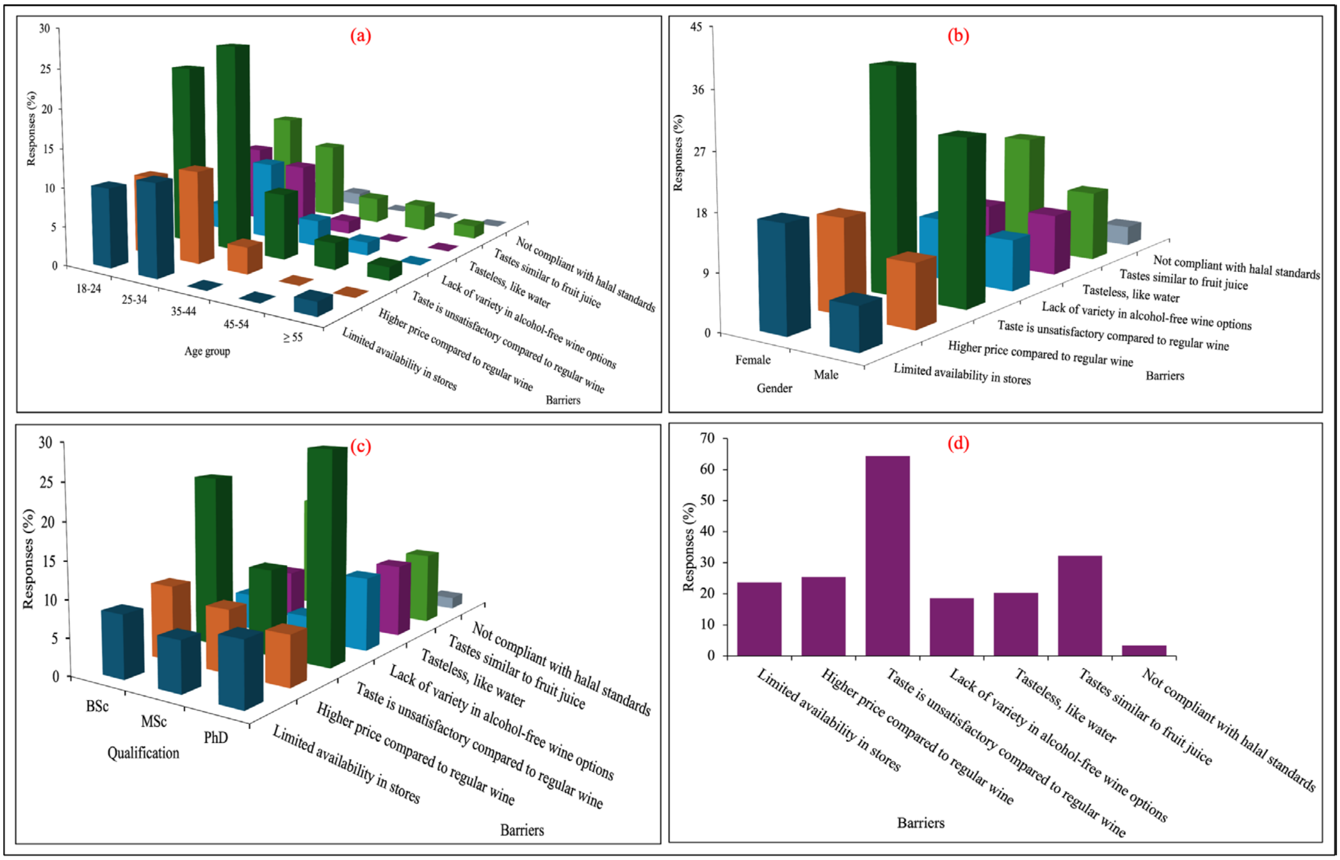

FIGURE 4 | Key barriers influencing consumer preference for purchasing or consuming alcohol-free wine across different age groups (a), gender (b), qualifications (c), and overall response (d).

Economic considerations also play a pivotal role, with 25.4% of participants expressing concerns about the "higher price compared to regular wine," suggesting that cost-value alignment is essential to foster consumer interest. This concern showed a slightly higher prevalence among females (15.3%), younger age groups (10.2% for both 18–24 and 25–34 years), and BSc participants (10.2%). Availability also emerged as a notable barrier, with 23.7% of respondents citing "limited availability in stores" as a deterrent, particularly among females (16.9%), younger consumers aged 18–34 years (10.2%–11.9%). The perception of alcohol-free wine as "tasteless, like water" was reported by 20.3% of respondents, with an equal representation of males and females (10.2% each), and this perception decreased with increasing age. Notably, 10.2% of PhD-level participants expressed this concern. Limited diversity in product offerings was reported by 18.6% of participants, indicating that a "lack of variety in alcohol-free wine options" may restrict consumer choice and engagement. This factor was more prevalent among females (10.2%), consumers aged 25–34 years (11.9%), and PhD participants (10.2%). Furthermore, cultural and religious considerations also influence acceptance, with 3.4% of respondents raising concerns about "noncompliance with halal standards," predominantly males in the 35–44 age group.

Furthermore, the chi-square test was performed to examine the associations between key barriers to the acceptance of alcohol-free wine and different demographic groups. The chi-square test results (Table 5) at $p < 0.05$, revealed no statistically significant associations between demographic variables (age, gender, and education) and key barriers. Additionally, a correspondence analysis provided a visual representation of the relationships between barriers and demographic groups (Figure 3b). The two axes (F1 and F2) together explain 64.55% of the variation in the data, with F1 contributing 36.36% and F2 contributing 28.19%. Barriers such as "limited availability in stores" and "higher price compared to regular wine," are associated with individuals aged 18–24 and those holding MSc degrees. Conversely, males, PhD holders, and individuals aged 25–34 were more closely associated with barriers such as "tasteless, like water" and "noncompliance with halal standards." Similarly, females and individuals with BSc degrees are closely associated with the perception that alcohol-free wine "tastes similar to fruit juice," a characteristic also shared by older age groups (≥ 55). Finally, individuals aged 35–44 were linked to the "lack of variety in alcohol-free wine options" and "taste unsatisfactory compared to regular wine."

In a study by Bruwer et al. (2014), key barriers to consumer adoption of lower-alcohol products were presented in a study involving 598 respondents in the United Kingdom. The most significant barrier, cited by 27.3% of participants, was the "unavailability of their favorite wines in a lower-alcohol version," indicating a notable gap in product diversity. Sensory and quality concerns emerged as critical factors, with 24.5% perceiving these wines as "lower quality than standard wine" and 21.2% stating "I dislike the taste." Economic considerations were also highlighted, with 16.3% noting the "higher price than standard wine" as a deterrent. Additionally, 16.1% reported dissatisfaction with the reduced alcohol content, stating it "does not contain enough alcohol to feel an effect," thereby failing to meet their

TABLE 5 | Key barriers to the acceptance of alcohol-free wine across demographic groups.

Barriers to acceptance of alcohol-free wine	Age group		Gender		Education	
	χ^2	*p*	χ^2	*p*	χ^2	*p*
Limited availability in stores	3.94	0.41	1.43	0.23	0.82	0.67
Higher price compared to regular wine	1.62	0.81	0.05	0.83	2.88	0.24
Taste is unsatisfactory compared to regular wine	0.52	0.97	0.24	0.62	0.34	0.84
Lack of variety in alcohol-free wine options	3.57	0.47	0.05	0.82	0.87	0.65
Tasteless, like water	4.11	0.39	0.50	0.48	0.37	0.83
Tastes similar to fruit juice	8.36	0.08	0.35	0.55	2.82	0.24
Not compliant with halal standards	0.55	0.97	2.81	0.09	0.54	0.76

Note: Chi-square test was conducted at a 95% significance level ($p < 0.05$).

expectations for achieving the desired effects. Accessibility and awareness issues further hindered adoption, with 12.7% describing these products as "difficult to find where I shop for wine" and 10.4% indicating "I am not aware of these products." Informational and cultural barriers were evident as well; 8.0% found it "not clear from the bottle what it is," 7.7% noted "my friends don't seem to drink it," and 4.1% expressed "I would be embarrassed to be seen drinking it." Interestingly, 18.1% of respondents cited "no clear reason" for avoiding these products, suggesting a subset of consumers may remain indifferent toward them. Furthermore, Stasi et al. (2014) found that price is a significant barrier for Italian consumers to purchase dealcoholized wine, as they tend to buy it only if there is a discount proportional to the reduction in alcohol content.

The present findings align with previous literature in emphasizing sensory shortcomings and economic factors as primary barriers to alcohol-free wine acceptance, underscoring the persistent challenge of replicating the taste and value perception of regular wine. However, unlike earlier studies that stressed lack of awareness or embarrassment as barriers, our results highlight demographic-specific perceptions (e.g., "tastes like fruit juice" and "tasteless, like water") and product diversity concerns, suggesting evolving consumer expectations with greater market exposure. These differences may be attributed to cultural context, consumer familiarity with alcohol-free options, and shifting health-driven preferences, indicating that barriers are not static but context- and cohort-dependent.

4 | Conclusion

In conclusion, this study highlights the growing interest in alcohol-free wine and the factors influencing its acceptance. The sensory analysis results indicated that the majority of participants could differentiate between wine samples based on alcohol content. The overall quality score significantly declined as the alcohol content decreased, with alcohol-free wine receiving the lowest quality scores. Key motivations for alcohol-free wine consumption include safety, health or wellness benefits, and the desire to avoid alcohol. These motivations varied by demographic factors, with health considerations more pronounced among females and higher-degree holders, and safety concerns more relevant for younger consumers. Conversely, the main barriers stem primarily from unsatisfactory sensory properties, higher prices, limited availability, and limited product diversity.

We acknowledge that this recruitment strategy introduces a sampling bias toward students and researchers in food science, which may limit the generalizability of the findings. Future studies could recruit a more diverse panel of consumers to better represent the general population, while also focusing on enhancing the sensory profile of alcohol-free wines (by improving production techniques while minimizing aroma losses), alongside consumer education and the development of marketing strategies to address barriers such as sensory shortcomings, cost, and limited variety. These efforts could play a crucial role in promoting broader acceptance and market growth for alcohol-free wines.

Author Contributions

Yogesh Kumar: conceptualization, methodology, formal analysis, investigation, software, data curation, writing – original draft. **Arianna Ricci:** editing and revising. **Giuseppina Paola Parpinello:** supervision, editing and revising. **Andrea Versari:** conceptualization, methodology, investigation, resources, supervision, visualization, editing, funding acquisition.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request. The metadata will be made available and searchable on the AMS Acta repository (https://amsacta.unibo.it/) by recording the DOI of the article soon after publishing.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Table S1:** Consumer questionnaire used during the survey and sensory analysis.