Consumer Perception Towards Online and Offline Pharmacy in Vadodara

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***Abstract*—The pharmaceutical retail sector in India is undergoing a significant transformation, marked by the coexistence of traditional brick-and-mortar pharmacies and the rapid growth of digital e-pharmacy platforms. This study presents a comprehensive analysis of consumer perceptions, preferences, and decision-making factors within the urban setting of Vadodara, Gujarat. Adopting a descriptive cross-sectional research design, data were collected from 250 adult respondents through a structured survey. The study examines key variables such as convenience, price sensitivity, trust in clinical quality, and digital literacy. Statistical analyses, including Chi-square tests, multiple linear regression, and paired-sample t-tests, were employed to identify significant patterns and differences in channel usage. The results indicate that although online pharmacies are valued for their efficiency and transparent pricing, offline pharmacies continue to hold a dominant share (47.2%), largely due to strong consumer trust and the advantage of immediate access to medicines. Quick service emerges as the primary factor influencing loyalty toward offline stores, while concerns regarding delivery delays and product authenticity remain major barriers to the adoption of online platforms. Additionally, the findings reveal a statistically significant preference ($p < 0.001$) for integrated service models, suggesting a shift toward a more combined retail approach. The study concludes by offering strategic recommendations to help pharmaceutical stakeholders adapt to evolving consumer expectations in an increasingly digital healthcare environment.**

***Index Terms*—Pharmaceutical Retail, E-Pharmacy Adoption, Consumer Perception, Vadodara Healthcare Market, Retail Pharmacy Loyalty, Digital Health Transformation.**

I. INTRODUCTION

The global pharmaceutical retail market is undergoing significant transformation, with its value estimated at USD 1.77 trillion in 2025 and projected to reach over USD 3.03 trillion by 2034, growing at a CAGR of 6.15%. Within this, the online pharmacy segment is expanding rapidly, with an expected CAGR of over 13% and a projected market size of nearly USD 439 billion by 2035. In India, the pharmaceutical retail sector is valued at approximately USD 27.4 billion in 2025 and is anticipated to grow at around 10% through 2030. (Billio, 2020)

Traditionally, India's pharmaceutical retail market has been highly fragmented, with nearly 89% of outlets operating in the unorganized sector. However, increasing smartphone penetration and supportive government initiatives, such as Digital India and the Ayushman Bharat Digital Mission, have accelerated the growth of organized digital platforms. Companies like Tata 1mg, PharmEasy, and Netmeds have transformed the market by offering home delivery, teleconsultation, and discounted pricing. (Sinha, 2023)

Gujarat plays a pivotal role in this landscape, contributing around 28% of India's pharmaceutical production and 31% of exports. The state continues to attract significant investment, with 183 new manufacturing units approved in FY2024–25. Within Gujarat, Vadodara stands out as an important urban center, offering a balanced demographic profile of digitally aware young consumers and older individuals reliant on ongoing medical care, making it a suitable setting to examine evolving pharmacy retail trends. (Asher, 2025)

II. LITERATURE REVIEW

(Bansal, 2022) studied the behaviour of the Indian population toward e-pharmacy and found that while awareness is moderate, actual usage rates remain low.

The research highlighted that younger, urban, and educated individuals are the primary adopters due to their digital familiarity.

(Limbu, 2024) investigated the factors influencing consumer purchase intentions and determined that trust in the platform is the most critical determinant of behaviour. The study revealed that when e-pharmacies integrate features like reliable payment systems and access to pharmacist consultations, consumer confidence increase significantly.

(Dcruz, 2022) outlined the rapid expansion of e-pharmacy in India and identified its pivotal role in improving medicine accessibility for remote and underserved populations. While the study praised the affordability and time efficiency of digital platforms for chronic disease management, it also warned of challenges such as regulatory uncertainty and resistance from traditional brick-and-mortar pharmacists.

(Ndem, 2019) explored perceptions of e-pharmacy in Nigeria and found a strong consumer preference for in-person interactions, largely due to fears of counterfeit products and low technological literacy among older citizens.
(Bahamdan, 2024) investigated customer satisfaction in Saudi Arabia and observed that high satisfaction levels are directly linked to timely deliveries and the availability of licensed pharmacists for online chat.

(Liu, 2020) utilized sentiment analysis on over 130,000 reviews to identify that logistics and delivery speed are the predominant concerns for Chinese e-pharmacy users, accounting for nearly 40% of all feedback. The research concluded that the professionalism of customer service and the reliability of the delivery network are the most influential factors in shaping positive consumer sentiment and long-term loyalty.

(Apte, 2024) explored the facilitators and barriers of e-pharmacy implementation in India, noting that these platforms could significantly support universal health coverage by streamlining supply chains.
Overall, the literatures reveal that while e-pharmacies significantly enhance healthcare accessibility, convenience, and affordability for chronic disease management, their global adoption is consistently hindered by a "trust gap" regarding counterfeit drugs, data privacy, and regulatory uncertainty. Ultimately, the research suggests that long-term success depends on integrating licensed pharmacist oversight with robust government regulations to ensure patient safety and product authenticity.

III. PROBLEM STATEMENT

Although online pharmacies provide competitive pricing and efficient logistics, many Indian consumers continue to rely on local chemists due to established trust and the need for immediate access to medicines. While digital platforms offer substantial discounts, concerns related to product authenticity and limited professional supervision remain key barriers. In contrast, offline pharmacies provide direct interaction and instant availability, which are particularly important in urgent healthcare situations, despite their pricing disadvantages. (Mishra, 2019)
This study examines the context of Tier-2 cities such as Vadodara, where increasing digital adoption coexists with traditional, trust-based purchasing behaviour. It explores the gap between consumer preferences for digital convenience and their continued reliance on physical stores for critical healthcare needs, with the objective of identifying the factors influencing channel choice and customer loyalty. The findings are intended to support the development of more balanced and consumer-focused healthcare delivery systems. (Bansal, 2022)

IV. OBJECTIVES OF THE STUDY

1. To find out how consumers in Vadodara view and prefer online versus offline pharmacy stores.
2. To identify the main reasons why people, choose either online or offline pharmacies, with a focus on convenience, price, trust, accessibility, and digital skills.
3. To understand what makes customers loyal to offline pharmacies, like quick service, pharmacist advice, personal attention, and reliability.
4. To explore the problems and challenges consumers face when using online pharmacies (like regulations, fake medicines, and lack of advice) compared to offline pharmacies (like fewer discounts and limited locations).

5. To explore future opportunities for hybrid pharmacy models that integrate offline trust and counselling with online convenience and pricing.

V. RESEARCH HYPOTHESES

- H_1: There is no significant difference in how consumers in Vadodara prefer online and offline pharmacies.
- H_2: Convenience, price, trust, and digital skills do not significantly influence consumer perception toward online pharmacies.
- H_3: Quick service, pharmacist advice, personal attention, and reliability do not influence customer loyalty toward offline pharmacies.
- H_4: Consumers do not face significantly more problems and challenges with online pharmacies compared to offline pharmacies.
- H_5: People are not significantly interested in using hybrid pharmacy models that combine online and offline features.

VI. RESEARCH METHODOLOGY

This study utilizes a descriptive, cross-sectional design to capture a real-time "snapshot" of consumer behaviour in Vadodara. This approach is ideal for the fast-moving healthcare sector, allowing for an efficient analysis of current trends without the constraints of a long-term study.

Data Collection & Sampling

- Primary Data:

Information was gathered via a structured Google Forms survey. The questionnaire collected key demographics (age, gender, income, and education) and utilized Likert-scale questions to quantitatively evaluate consumer perceptions, motivations, and challenges across both pharmacy channels.

- Secondary Data:

Contextual research was drawn from academic databases like Google Scholar and ResearchGate, alongside government health reports and e-pharmacy industry publications.

- Sampling:

The study targeted adult consumers (18+) in Vadodara who regularly purchase medicines. Using simple random sampling to minimize bias, a final sample of 250 respondents was achieved a robust size for an urban exploratory study.

All collected data was processed and analyzed using Jamovi statistical software to ensure accuracy and professional rigor in the findings.

VII. DATA ANALYSIS AND INTERPRETATION

Descriptive Analysis

Demographic Variables	Categories	Frequency	Percentage
AGE	18-25 years	95	38%
	26-35 years	51	20.4%
	36-45 years	44	17.6%
	46-60 years	37	14.8%
	Above 60 years	23	9.2%
GENDER	Male	118	47.2%
	Female	132	52.8%
INCOME	Below ₹2,50,000	57	22.8%
	₹2,50,001 – ₹5,00,000	57	22.8%
	₹5,00,001 – ₹8,00,000	54	21.6%
	₹8,00,001 – ₹12,00,000	60	24%
	Above ₹12,00,000	22	8.8%
EDUCATION	Below Higher Secondary	45	18%
	Higher Secondary (12th)	61	24.4%
	Graduate	67	26.8%
	Post Graduate	77	30.8%

The sample is predominantly composed of young adults, with nearly 60% aged 18–35, indicating a strong familiarity with digital platforms. At the same time, the inclusion of 9.2% respondents above 60 ensures representation of long-term and chronic care users.

Most respondents are well-educated (over 57% graduates or postgraduates), which likely contributes to greater awareness of medicine quality and openness to adopting e-health services. Income levels are balanced, with a concentration in the middle-income

group (₹8–12 lakhs), reflecting sensitivity to both cost savings and convenience.

The gender distribution is nearly equal (52.8% female, 47.2% male), suggesting similar adoption patterns across genders in this context. Overall, this young, educated, and middle-income profile indicates that while consumers possess the capability and incentive to shift toward e-pharmacies, concerns related to quality and trust continue to sustain their preference for traditional local pharmacies.

Inferential Statistical Analysis

To move beyond descriptive analysis, the data was subjected to rigorous inferential testing to identify causal relationships and significant differences between consumer segments.

Hypothesis 1: Distribution of Pharmacy Preferences

The first hypothesis tested whether there was a significant difference in how consumers in Vadodara prefer online and offline pharmacies. A Chi-Square Goodness-of-Fit test was conducted at a 5% level of significance.

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where:

- χ^2: The Chi-Square test statistic.
- $\sum$: The symbol for "summation"
- O_i: The Observed frequency
- E_i: The Expected frequency

Chi-Square Goodness-of-Fit Test for Pharmacy Preference

Proportions - Mode of pharmacy preferred			
Level	Count		Proportion
Both	Observed	44	0.176
	Expected	83.3	0.333
Offline	Observed	118	0.472
	Expected	83.3	0.333
Online	Observed	88	0.352
	Expected	83.3	0.333

χ^2 Goodness of Fit		
χ^2	χ^2	χ^2
33.2	33.2	33.2

The test yielded a value of $\chi^2 = 33.2$ with $df = 2$ and $p < 0.001$. This highly significant p-value led to the rejection of the null hypothesis (H_0).

The data reveals a clear preference hierarchy: 47.2% for Offline, 35.2% for Online, and 17.6% for Both (Hybrid). This shows that the market is not a one-size-fits-all scenario. Instead, people switch between channels based on the situation: they stick to offline chemists for urgent needs or when a prescription feels "high-stakes," but turn to online platforms for routine refills where saving money is the top priority.

Hypothesis 2: Drivers of Online Perception

The second hypothesis sought to determine if convenience, price, trust, and digital skills significantly influence consumer perception toward online pharmacies. A multiple linear regression analysis was applied (*N*=88).

Regression Analysis of Factors Influencing Consumer Perception toward Online Pharmacies

Model	R	R^2	Adjusted R^2
1	0.313	0.0982	0.0547

Note. Models estimated using sample size of N=88

Predictor	Estimate	SE	t	p
Intercept	1.6884	0.3443	4.904	<.001
Convenience means	0.1797	0.0921	1.951	0.054
Trust mean	0.0616	0.0827	0.745	0.458
Price mean	0.0988	0.0756	1.306	0.195
Digital skills	0.0305	0.0556	0.548	0.585

The regression results show that the selected variables explain only a limited share of consumer perception ($R^2 = 0.0982$), indicating that they are not the main influencing factors. None of the predictors were statistically significant ($p > 0.05$), although *convenience* came close ($p = 0.054$).

This suggests that external factors such as brand reputation and digital marketing play a more substantial role. Platforms like Tata 1mg and PharmEasy likely influence consumer perceptions more strongly than the variables included in the model.

Hypothesis 3: Determinants of Offline Loyalty

The third hypothesis examined the influence of service-related factors (quick service, advice, personal attention) on customer loyalty toward offline

pharmacies. Regression analysis (N=118) revealed a much stronger relationship (R = 0.571, R^2 = 0.326).

Multiple Linear Regression Analysis

Model	R	R^2
1	0.571	0.326

Note. Models estimated using sample size of N=118

Predictor	Estimate	SE	t	p
Intercept	1.1893	0.2313	5.141	<.001
Accessibility	0.0973	0.0660	1.475	0.143
Pharmacist Advice	0.0471	0.0637	0.739	0.461
Quick Service	0.2897	0.0547	5.296	<.001
Medicine authenticity	0.0267	0.0715	0.374	0.709
Personalized Attention	0.0878	0.0649	1.352	0.179

The findings indicate that quick service ($p < 0.001$) is the only variable that exerts a statistically significant influence on customer loyalty. In contrast, factors such as pharmacist advice and personalized attention were not found to have a significant effect within this sample.

These results suggest a notable shift in consumer expectations, with greater emphasis placed on efficiency and timeliness of service. In the context of increasingly rapid delivery models, customers appear to value prompt service over traditional relational aspects of in-store experiences. Accordingly, the continued competitiveness of local pharmacies is likely to depend more on their ability to provide swift and efficient service, rather than relying primarily on interpersonal interactions.

Hypothesis 4: Comparative Challenges and Problems

A paired samples t-test was conducted to compare the mean "problem" scores of online and offline pharmacies (N=44).

Paired Samples T-Test Analysis

	N	Mean	Median	SD	SE
Problems Online Mean	44	3.62	4.00	0.874	0.132
Problem Offline Mean	44	2.67	3.00	0.731	0.110

		statistic	df	p
Problem Offline Mean	Student's t	10.9	43.0	<.001

Note. H_a $\mu_{Measure\ 1 - Measure\ 2} \neq 0$

The results (t = 10.9, df = 43, $p < 0.001$) indicate that consumers experience significantly more issues with online pharmacies (mean = 3.62) compared to offline pharmacies (mean = 2.67). These challenges are primarily associated with operational inefficiencies, particularly delayed deliveries (31%) and the receipt of incorrect products (34.2%). Such findings underscore the logistical difficulties involved in managing and scaling e-pharmacy services, especially within the complex and densely populated urban environments of India.

Hypothesis 5: Interest in Hybrid Models

The final hypothesis explored whether consumers are interested in hybrid models that integrate online and offline features.

One Sample T-Test for online and offline pharmacy models

							95% Confidence Interval	
		Statistic	df	p		Effect Size	Lower	Upper
Online_Q14	Student's t	-3.51	87.0	<.001	Cohen's d	-0.374	-0.589	-0.157
Offline_Q12	Student's t	-4.99	117	<.001	Cohen's d	-0.459	-0.648	-0.269
Note. H_a $\mu \neq 3$								

	N	Mean	Median	SD	SE
Online_Q14	88	2.48	2.00	1.40	0.149
Offline_Q12	118	2.34	2.00	1.44	0.133

The results of the one-sample t-tests for both online ($p < 0.001$) and offline ($p < 0.001$) users indicate a statistically significant preference for integrated service models. Notably, offline users demonstrated a strong willingness to adopt digital services such as

online ordering when provided by their trusted neighbourhood pharmacies (mean = 2.34). These findings suggest an increasing convergence of physical and digital service channels, highlighting a potential direction for the evolution of the retail pharmacy sector in Gujarat.

VIII. FINDINGS

Based on the analysis of survey data, the following key findings were identified:

1. Many respondents belong to the younger and educated demographic groups, indicating high exposure to digital services.
2. Consumers show similar perceptions toward online and offline pharmacies, with a slight preference toward online services.
3. Offline pharmacies remain the most preferred mode, although online pharmacies are gaining acceptance.
4. Age and gender do not significantly influence pharmacy preference, suggesting that consumer choice is driven more by service factors.
5. Convenience, price, trust, and digital skills do not significantly influence perception toward online pharmacies.
6. Quick service is the most important factor driving loyalty toward offline pharmacies.
7. Consumers experience more problems with online pharmacies compared to offline pharmacies.
8. There is strong consumer interest in hybrid pharmacy models, combining online convenience with offline consultation and trust.

IX. SUGGESTIONS

1. Build Digital Trust: Implement clear medicine verification and secure payment transparency to boost consumer confidence.
2. Adopt Hybrid Models: Combine online ordering with in-person pharmacist consultations to offer the "best of both worlds."
3. Prioritize Speed Offline: Streamline in-store workflows to minimize wait times, as quick service is the primary driver of offline loyalty.
4. Digitalize Traditional Stores: Introduce WhatsApp ordering or prescription uploads at local pharmacies to compete with apps.
5. Educate the Consumer: Launch awareness campaigns focused on safe online purchasing and the benefits of digital pharmacy services.

X. RECOMMENDATIONS

Based on the empirical findings, the following strategic recommendations are suggested for strengthening both online and offline pharmacy sectors:

1. Adopt integrated service models:

Pharmacies should combine digital convenience with in-store trust and consultation to meet evolving consumer expectations.

2. Improve service efficiency in offline stores:

Since speed is the primary driver of loyalty, local pharmacies should focus on faster prescription processing and billing.

3. Address operational issues in online platforms:

E-pharmacies need to enhance delivery reliability, ensure order accuracy, and simplify return or replacement procedures.

4. Strengthen trust in digital platforms:

Clear verification processes, transparent sourcing, and secure payment systems are essential to build consumer confidence.

5. Encourage digital adoption among traditional pharmacies:

Features such as WhatsApp ordering, digital prescriptions, and local home delivery can help them remain competitive.

6. Focus on service-oriented marketing:

As demographic factors are not significant, promotional efforts should emphasize service quality, convenience, and safety rather than targeting specific age or gender groups.

XI. CONCLUSION

The pharmaceutical retail sector in Vadodara is experiencing a notable shift as digital advancements influence consumer expectations. While online pharmacies are viewed more favourably for their convenience and time-saving benefits, offline

pharmacies continue to dominate due to established trust, immediate availability of medicines, and direct interaction with pharmacists.

The analysis further shows that factors such as age and gender do not significantly affect consumer preferences, indicating that choices are largely shaped by service performance. Although online platforms offer efficiency, they face more service-related issues, whereas customer loyalty toward offline pharmacies is primarily driven by prompt service delivery.

Overall, the results highlight the growing importance of an integrated approach, where combining digital accessibility with the reliability and personalized support of physical stores can best address evolving consumer needs.

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