

Post-COVID-19 Online Purchasing of OTC Topical Analgesics: A Cross-Sectional Study of Digital Marketing Influence and e-Pharmacy Adoption in Urban India

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Received: 21 Jul 2026; Received in revised form: 31 Aug 2026; Accepted: 05 Sep 2026; Available online: 16 Sep 2026

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Abstract— The COVID-19 pandemic has furthered a structural change in pharmaceutical retail, as consumers moved away from brick-and-mortar pharmacies to e-pharmacy platforms and digital marketing channels. This was especially so for over-the-counter (OTC) topical analgesics, gels, creams, sprays and patches that provide localised pain relief in a very direct way. In this investigation, we studied the factors that motivated individuals in Mumbai and peri-urban Maharashtra to purchase these over-the-counter topical analgesics in higher quantities online post-COVID-19 pandemic. The focus was on the omnichannel buying pattern finally adopted by people, consumer trust, e-pharmacy platform features and digital marketing stimuli. We conducted a cross-sectional exploratory-descriptive survey by using Google Forms among a sample of 250 adult consumers (≥ 18 years) who had used OTC topical analgesics in the past year. The questionnaire consisted of 25 items, mostly Likert 1–5, with some multiple-choice questions. Three outcome proxies and nine driver constructs was operationalised. We applied descriptive statistics, OLS regression, chi-square with Cramér's V, and two-way ANOVA to analyse the data. One major thing that got revealed is that the mean of the OPF proxy (Q23) was 3.98 (SD=0.83) and 74.4% of the respondents supported an increase in online purchasing after the COVID-19 pandemic. Convenience turned out to be a strong factor shaping the re-ordering behaviour ($\beta=0.70$, $R^2=0.50$). Also, the visibility of licensed sellers was very important and it was strongly tied with the intent to subscribe ($\chi^2=11.1$, $p=0.004$, $V=0.21$) and with the ease of re-ordering ($\chi^2=9.6$, $p=0.002$, $V=0.20$). Pain cadence was a significant predictor of OPF ($F=7.38$, $p=0.007$, $\eta^2=0.029$). When the sample got split up, chronic patients had the highest OPF ($M=4.13$). Moreover, the most noticeable store-first purchase patterns showed up among chronic users (61%) and seniors (65%), suggesting they were not evenly distributed. Overall, the buying of OTC topical analgesics has undergone a lasting digital transformation after the COVID-19 pandemic. This transformation is driven by the condition-driven needs that individuals continue to face in their daily lives, as well as cues of convenience and trust. In addition, digital marketing features have had a significant impact on this transformation. The new retail environment is characterised by channel complementarity rather than channel displacement.

Keywords— OTC topical analgesics, e-pharmacy, digital marketing, post-COVID-19, consumer purchasing patterns, online pharmacy, perceived risk, trust, omnichannel retail, Mumbai, India



I. INTRODUCTION

The COVID-19 pandemic was an inflection point for pharmaceutical retail unlike any seen before as it completely changed consumer preferences to e-pharmacy platforms, online marketplaces and Direct-to-Consumer (D2C) brand websites, whereas it was anticipated to occur over a span of a decade (Fittler et al., 2022). Among the most impacted categories were OTC topical analgesics, gels, creams, sprays and patches. They're basically non-prescription products that people often re-use on a pretty predictable schedule, and they're really well-aligned with sports injuries, arthritis, and those strains that come from everyday work so, in practice they're a high match for self-guided online purchasing. In India consumers generally purchased these over-the-counter topical analgesic drugs from local pharmacies, mainly because they're easy to find and you can ask a pharmacist for quick, useful guidance, even if it's brief. Then the ensuing lockdown happened, stores shut down, and the whole buying process just moved fast to e-pharmacies and D2C platforms, like it compressed years of "expected" digital adoption into only months (Bhatt, 2024). "Is it a coincidence that this has happened in cities like Mumbai? The real reasons for this shift were higher smartphone penetration, affordable mobile internet and a large urban population that self-medicates. Still, the role of digital marketing stimuli in keeping the transition going was less well documented (Sampat & Sabat, 2022).

The cross-sectional study includes 250 adult consumers from Mumbai and peri-urban Maharashtra, it deals with four research questions around driver constructs, demographic moderators, e-pharmacy authenticity perceptions, and post-COVID omnichannel patterns. The research adds to the existing literature on pharmaceutical digital marketing (Anis & Hassali, 2022; Anis & Tan, 2023), e-pharmacy adoption (Sampat & Sabat, 2022; Venkatesh et al., 2024), and omnichannel retail dynamics (Liu et al., 2022; Salvietti et al., 2022).

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Digital Marketing of OTC Medicines and E-Pharmacy Growth

According to Anis and Hassali (2022) the four main kinds of PDM were social media marketing, SEO, e-commerce and D2C platforms, plus mobile health applications. The last two modes, basically saw the largest post-COVID expansion across dedicated portals, broader general marketplaces and also brand owned D2C archetypes. Peer review systems showed up as the primary engine for first-time e-pharmacy conversion but platform trust was the top factor when it came to retaining e-pharmacy customers (Anis and Tan, 2023).

Consumer Behaviour Drivers and Barriers

Convenience, delivery speed, and frictionless comparisons still seem like the most consistent push factors behind online OTC buying (Stobbe et al., 2024). Perceived risk is still, by far, the main obstacle. Observation. In general, when licensed seller verification is available, plus batch-related details, and telepharmacy access too, conversion improves, basically because perceived risk gets dialed down (Fittler et al., 2022; Sampat & Sabat, 2022; Bojanowska et al., 2023; Rouidi et al., 2022). Miller et al. (2021) also warned that technology adoption in low- and middle-income countries often happens before the regulatory framework is actually set up. That timing mismatch then translates into more patient safety worries.

Theoretical Framework

Ghosh et al. (2023) did a test on TAM (Davis, 1989) for Indian digital pharmacy, and they found that ease-of-use comes out as the main factor in adoption. Then the SOR model, in turn, tends to describe purchasing as a reaction to stimuli, but somehow it goes through trust as well as convenience (Bhatt, 2024). As for PMT (Rogers, 1975) it helps explain how pandemic conditions pushed more channel diversification, and this kind of behavior is also backed by Liu et al. (2022).

III. MATERIALS AND METHODS

Study Design

This study used a pragmatic, interpretivist, cross-sectional exploratory-descriptive approach, to tease out patterns in the ties between the driver constructs and the proxies of purchase outcome, but without jumping to any causal story. The setting was Mumbai and peri-urban Maharashtra, and the reference period was 2023.

Participants and Sampling

We recruited adults (age 18 and above) who had used at least one OTC topical analgesic within the past 12 months. Participants were brought in through purposive-convenience sampling (N=250) via WhatsApp groups, resident associations, fitness groups, and QR code flyers placed in pharmacies. It was also required that record retention be $\geq 80\%$ of the records, before inclusion.

Data Collection

The questionnaire ended up being split into three sections: a demographic part, a Likert scale part, and an outcome proxy part. It had 25 items in total, covering nine constructs of the driver (Convenience, Delivery Reliability, Information Clarity, Advice Quality, Trust/Authenticity, Price Sensitivity, Social Proof, Brand Cues, Prior Online Experience) and three constructs for the outcome proxies (OPF, Re-order propensity, Continuity/Habit). A pilot test with 30 respondents helped sharpen the meaning of the trust cues, and it also added dosing pictograms, with a median completion time of 10.5 minutes.

Data Analysis

We rescaled all the composite indices into a 0–100 range, and then looked at the internal consistency, by applying Cronbach's alpha. As for how the driver behaviours were linked with outcomes, we ran

Pearson correlations and also did two OLS regression models (Model A—core drivers, Model B—Prior Online Experience and Price Sensitivity plus core drivers), plus a two-way ANOVA, just to test the segment effects. Ethical clearance was received from Sikkim Professional University, and participation was purely voluntary and anonymous.

IV. RESULTS

Sample Profile

Table 1 presents the whole sample profile, like in one place. This is consistent with the high prevalence of smartphone use in urban Maharashtra, where the age distribution was primarily concentrated within the 25–44 age group (61.2% combined). A fairly sizeable 55+ group (9.6%) was also there, which helped in building trust and forming those advice contrasts between the various age groups. The gender split seems close to even (46.0% women, 50.0% men). For education, the emphasis leaned toward undergraduate and postgraduate study, 74.8% in total. After COVID, the movement toward online purchase was pretty noticeable: 74.4% of the respondents said they now buy OTC topical analgesics online more than they did before 2020 (Q23; $M=3.98$, $SD=0.83$), and 75.6% also agreed that “buy again” features make re purchasing easier than just going into a store (Q5; $M=4.05$, $SD=0.82$).

Table 1. Sample Profile (N = 250).

Variable	Category	n (%)
Age Band	18–24	36 (14.4%)
	25–34	88 (35.2%)
	35–44	65 (26.0%)
	45–54	37 (14.8%)
	55+	24 (9.6%)
Gender	Woman	115 (46.0%)
	Man	125 (50.0%)
	Non-binary / Prefer not to say	10 (4.0%)
Education	Up to Secondary / SSC	51 (20.4%)
	Undergraduate	113 (45.2%)
	Postgraduate	74 (29.6%)
	Other	12 (4.8%)

OPF proxy (Q23)	M = 3.98, SD = 0.83; %Agree (4-5) = 74.4%	
Re-order proxy (Q5)	M = 4.05, SD = 0.82; %Agree (4-5) = 75.6%	
Continuity (Q18)	M = 3.92, SD = 0.90; %Agree (4-5) = 69.6%	

Descriptive Statistics: Driver Constructs

That top cluster, with a high mean over 22 items was mostly intact delivery (M=4.05); there were also online purchases that basically point to the buy again convenience (M=4.05, 75.6% agree) and online purchases for batch/expiry reassurance (M=4.03, 74.4% agree). Then it also had the quick repurchase bit (M=4.01) and the online marker showing the post COVID shift (M=3.98, 74.4% agree), coming through as routine online replenishment behavior. Lower mean items were discount-led trial (M=3.44), advice timeliness (M=3.52), and pharmacist chat visibility (M=3.53), which signified constructs that were more sensitive to the segment. Agreement for brand cue items was consistently high, notably with consistent naming (Q22: M=3.96; 72.0% agree) confirming the

low error replenishment mechanism of crisp mobile-friendly pack recognition.

Drivers of Online Purchase Frequency - RQ1

Convenience was the strongest predictor of Re-order propensity ($\beta=0.70$, $R^2=0.50$) while Delivery Reliability and Trust/Authenticity were only modestly influential ($\beta=0.08$, $\beta=0.04$ respectively); no changes in the fit of the regression models were observed if Prior Online Experience and Price Sensitivity were added in Model B. Overall associations were small ($R^2=0.04-0.05$) for OPF (Q23), with Trust/Authenticity having the highest coefficient ($\beta=-0.21$) – pandemic era exogenous drivers. There was little explained variance in the scores for Continuity/Habit ($R^2=0.00-0.01$), indicating that it is best explained by cross-tabulations of product fit and personal value trade-offs.

Table 2. OLS Regression: Standardised Coefficients (β) and R^2 – Driver Constructs vs Outcome Proxies (N = 250).

Outcome (DV)	Model	R^2	β Conv	β Deliv	β Trust	β Info	β PriorExp	β Price
OPF (Q23)	A	0.04	0.03	-0.08	-0.21	0.06	—	—
OPF (Q23)	B	0.05	0.03	-0.08	-0.20	0.06	-0.03	-0.01
Re-order (Q5)	A	0.50	0.70	0.08	0.04	-0.04	—	—
Re-order (Q5)	B	0.50	0.69	0.07	0.04	-0.04	-0.04	-0.06
Continuity (Q18)	A	0.00	0.01	0.06	0.01	0.00	—	—
Continuity (Q18)	B	0.01	0.01	0.06	0.01	0.01	-0.02	0.04

Demographic and Functional Moderation - RQ2

The results of the two-way ANOVA showed that there was a significant difference between chronic pain sufferers (M=4.13) and episodic users (M=3.84) ($F=7.38$, $p=0.007$, $\eta^2=0.029$; Table 3). The main effect of

digital familiarity was not significant ($F=1.43$, $p=0.242$) and suggests that, in and of itself, the degree of digital skill does not contribute to online purchasing; rather, the degree of pain drives online purchasing.

Table 3. Two-Way ANOVA: Pain Cadence $\times$ Digital Familiarity on OPF Proxy (N = 250).

Source	Sum Sq	df	F	p-value	Partial η^2
Pain cadence	4.86	1	7.38	0.007	0.029
Digital familiarity	1.88	2	1.43	0.242	0.012
Pain cadence $\times$ Digital familiarity	2.31	2	1.76	0.174	0.014
Residual	160.55	244	—	—	—

Trust, Authenticity, and Advice Perceptions - RQ3

The results from the chi-square analysis (Table 4) showed, there were significant associations between the authenticity cues and outcomes. The licensed-seller badge noticeability seemed tied to re-order ease ($\chi^2=9.6$, $p=0.002$, $V=0.20$) and also to continuity

($\chi^2=7.2$, $p=0.007$, $V=0.17$) a bit. The most noticeable conversion link that pharmacist chat visibility had, was with the OPF conversion ($\chi^2=10.4$, $p=0.001$, $V=0.21$). Meanwhile the strongest conversion association for perceived advice usefulness was with the OPF conversion too ($\chi^2=11.8$, $p=0.001$, $V=0.22$).

Table 4. Chi-Square and Cramér's V: Authenticity Cues and Advice Features vs Outcome Markers (N = 250).

Test	χ^2	df	p-value	Cramér's V	Interpretation
Licensed seller noticed × Re-order ease	9.6	1	0.002	0.20	Moderate positive
Batch/expiry visible × Re-order ease	8.3	1	0.004	0.18	Small-moderate
Licensed seller noticed × Continuity	7.2	1	0.007	0.17	Small-moderate
Batch/expiry visible × Continuity	6.5	1	0.011	0.16	Small-moderate
Authenticity cues × Subscription intent	11.1	2	0.004	0.21	Moderate
Advice visible × OPF (conversion)	10.4	1	0.001	0.21	Moderate
Advice useful × OPF (conversion)	11.8	1	0.001	0.22	Moderate
Advice visible × Continuity	7.9	1	0.005	0.18	Small-moderate
Advice useful × Continuity	8.7	1	0.003	0.19	Small-moderate

Omnichannel Patterns - RQ4

The results were consistent with the predominant store-first online-replenishment behaviour with 68.4%, of which 3.90% agreed in Q25. Store-first preference was highest among the seniors (60+) and also had a high OPF (M=4.03) indicating the tendency

of authentic trial and digitized replenishment. Chronic pain sufferers were very integrated in their omnichannel usage (61% of those surveyed said they store first, then visit OPF M=4.13). The immediacy preference was inversely correlated with store reliance (Table 5, $\chi^2=6.9$, $p=0.009$, $V=0.17$).

Table 5. Omnichannel Patterns by Consumer Segment (N = 250).

Segment	% Agree Q25 (store-first)	Mean OPF (Q23)	Interpretation
Younger adults (21-30)	41%	4.05	Digital-native; store as trial touchpoint only
Middle-aged (41-50)	58%	3.92	Moderate store reliance; habit shifts slower
Seniors (60+)	65%	4.03	Store-first for trust; online for replenishment
Chronic pain sufferers	61%	4.13	Heavy store-first; then online subscription
Episodic/fitness users	43%	3.84	Opportunistic; immediacy/promotion-driven

V. DISCUSSION

These findings basically confirm a lasting after COVID shift toward digital for OTC topical pain relief shopping in urban India. Convenience was the main re order predictor ($\beta=0.70$, $R^2=0.50$) which validates the TAM based idea that frictionless, one tap UX pushes habitual digital purchasing, even past the

initial disruption period (Ghosh et al., 2023; Stobbe et al., 2024). In the Model B, the explanatory power of Prior Online Experience and Price Sensitivity was negligible. This is consistent with a high level of continuity agreement (Q18; M=3.92, 69.6% agree). The small R^2 of the OPF (0.04-0.05) cannot account for exogenous pandemic drivers like lockdown, health

anxiety and proliferation of platforms (Fittler et al., 2022; Bhatt, 2024). But the strong Q23 agreement (74.4%) confirms the shift.

The most actionable findings of the study are the chi-square results for authenticity cues. The support for the SOR framework can be seen in the strong relationship between re-order ease ($V=0.20$) and subscription intent ($V=0.21$) and visibility of the licensed-seller badge (Bhatt, 2024). An example of how better product-page design has a significant impact on consumer uncertainty is the gradient of information clarity (advice-need at 61% in the lowest quartile and 22% in the highest quartile) (Miller et al., 2021). ANOVA confirmed pain cadence ($p=0.007$), not digital familiarity ($p=0.242$), as the independent OPF predictor, extending beyond digital-literacy-focused literature (Sampat & Sabat, 2022) and aligning with PMT-based channel diversification (Liu et al., 2022). Omnichannel patterns corroborate Salvietti et al.'s (2022) retail complementarity thesis, with delivery immediacy negatively associated with store-first orientation ($V=0.17$), confirming same-day capability as the threshold for e-pharmacy displacement of physical pharmacies even in acute transactions (Anis & Tan, 2023).

VI. CONCLUSION

The results of this cross-sectional study of 250 adult consumers in Mumbai and peri-urban Maharashtra suggest that the post-COVID-19 trend of purchasing OTC topical analgesics online is structurally robust and is propelled by usage convenience, trust signals, necessity for the condition. Convenience has the strongest influence on re-order behaviour ($\beta=0.70$, $R^2=0.50$); the strongest relationship found is between authenticity cues and subscription intent (Cramér's V up to 0.21); and the strongest OPF is found with pain cadence rather than digital familiarity ($F=7.38$, $p=0.007$). The emergent retail pattern is omnichannel specialisation and not displacement. Frictionless re-order UX, highly visible display of an authenticity signal, and subscription offerings for chronic pain segments are examples of priorities for e-pharmacy operators. For regulators, the findings back their demands for transparent product origin and verification of the seller by a licence authority on OTC marketplaces.

The limitations are: Cross-sectional design, purposive sampling, and self-report bias. Longitudinal and quasi-experimental designs should be employed in future research to achieve causal platform effects and to assess the safety profile of OTC self-medication by algorithms.

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