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Original Research Article

Role of commercial determinants in shaping alcohol consumption and health outcomes in Rajasthan: a convergent mixed-methods study

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ABSTRACT

Background: Rajasthan being India's highest-revenue alcohol states, with approximate excise collections exceeding INR 9,229 crore by November 2023-24 and sales of 876.86 lakh bulk litres of total country liquor and 413.69 lakh bulk liters of Indian-Made Foreign Liquor (IMFL). Commercial determinants like excise policies, outlet density, pricing strategies, and surrogate advertising are increasingly recognized as structural drivers of consumption and health harm. Objectives of the study were to map commercial determinants against alcohol sales trends and health indicators in Rajasthan; to identify stakeholder perceptions of industry influence and regulatory barriers; and to recommend targeted mitigation strategies.
Methods: A convergent parallel mixed-methods design was employed, adhering to COREQ guidelines. Secondary data from the Rajasthan State Excise Department, NFHS-5, and health records were analysed using descriptive statistics and multiple linear regression. Primary data comprised semi-structured interviews with 20-25 purposively sampled key informants, analysed thematically in NVivo 14.
Results: Sales volumes grew approximately 18% between 2018 and 2023, closely tracking revenue-maximizing excise reforms. Outlet density was positively correlated with alcohol- attributable domestic violence ($r=0.67$, $p<0.01$). Surrogate advertising was identified by 78% of informants as the primary industry marketing channel. ABV awareness was absent in 41% of consumers.
Conclusions: Commercial determinants substantially shape consumption patterns and health burdens in Rajasthan. A multi-pronged response combining outlet regulation, surrogate

Keywords: Commercial determinants of health, Alcohol policy, Rajasthan, Excise regulation. Surrogate advertising, Domestic violence, Mixed methods

INTRODUCTION

Alcohol consumption is the primary risk factor for morbidity and mortality globally, accountable for approximately 3 million deaths annually.[1] In India, the burden is sporadically distributed across states, with Rajasthan exhibiting a distinct profile of heavy consumption, fiscal dependence on excise revenue, and related health harms. The state recorded aggregate country liquor sales of 876.86 lakh bulk liters and IMFL sales of 413.69 lakh bulk liters in 2022-23, with excise revenues surpassing INR 9,229 crore by November 2023-24.[2,3]

Commercial determinants of health (CDoH) are the private-sector structures, strategies, and conditions that shape population health outcomes.[4] In the alcohol context, these encompass revenue-oriented excise architectures, retail outlet density and placement, tiered pricing strategies targeting low-income consumers, and the ecosystem of surrogate advertising that circumvents

India's direct alcohol advertising prohibition under the Cable Television Networks (Regulation) Amendment Rules, 2000.[5,6]

Health consequences of alcohol consumption in Rajasthan are severe. NFHS-5 data indicate 14.2% male consumption prevalence (15-49 years), with markedly higher rates in Scheduled Tribe districts of the Mewar and Vagad regions.[7] Studies from rural Jaipur attribute approximately 41% of domestic violence incidents to alcohol use.[8] Depression comorbidity with alcohol use disorder (AUD) has been documented in 28-35% of male psychiatric outpatients at secondary care facilities in Jodhpur and Udaipur.[9] A critical awareness deficit compounds these risks: approximately 41% of consumers are unaware of the alcohol by volume (ABV) content of their preferred products.[10]

Despite these documented harms, research examining the structural, commercial drivers of alcohol consumption in Rajasthan remains sparse. Most prevailing literature focuses on individual behavioral determinants or clinical sequelae without putting them within the broader political economy of alcohol supply.[11,12] This study addresses that gap through a convergent mixed-methods design integrating secondary data analysis with qualitative insights from key informants embedded across Rajasthan's alcohol supply chain, regulatory environment, and affected communities.

Research objectives

The three important objectives of the current study include mapping commercial determinants—involving excise policies, outlet density, pricing tactics, and surrogate advertising against alcohol sales trends and health indicators in Rajasthan (2018-2025).

Elicit stakeholder perspectives on industry influence and identify barriers to effective regulation.

Develop evidence-based policy recommendations to reduce alcohol-related harms, with focus on domestic violence, depression, and burden of public health diseases.

Background and literature review

The Global commercial determinants framework

The CDoH concept has gained significant scholarly traction since its formalisation in alcohol and tobacco policy contexts.[4] Jernigan and Ross documented that global alcohol retail sales exceeded USD 1.5 trillion in 2017, with production controlled by a small oligopoly whose high per-dollar profit margins fund marketing expenditures that function as barriers to both market entry and health regulation.[13] Their analysis demonstrated that industry self-regulation consistently fails to limit youth-targeted or high-volume marketing, and that statutory public health responses have lagged far behind industry innovation in digital and surrogate channels.

In low- and middle-income countries (LMICs), outlet accessibility has been identified as among the most powerful predictors of per-capita consumption, outweighing income growth and urbanization.[14] Globally, an established association between alcohol outlet density and intimate partner violence, road traffic injuries, and mental illness further emphasizes the health relevance of supply- side commercial decisions.[15]

Alcohol policy architecture in India

Regulatory framework of alcohol industry in India is constitutionally decentralized to states under the Seventh Schedule, producing a uneven patchwork of excise regimes.[16] States develop extensive fiscal revenues from alcohol in some cases 15-25% of own-tax revenue creating structural conflicts of interest wherein regulatory agencies simultaneously serve as revenue collectors and public health guardians.[17] NIPFP (2024) has documented that India's alcohol taxation regime is predominantly volume-based rather than value-based, limiting the effectiveness of price-based demand suppression strategies.[18]

Direct alcohol advertising is prohibited under India's Cable Television Networks (Regulation) Amendment Rules, 2000, and the Advertising Standards Council of India (ASCI) Code prohibits promotions targeting minors or associating alcohol with social or sexual success. However, enforcement is inconsistent. Industry estimates suggest leading Indian alcobev brands allocate 30- 40% of marketing budgets to surrogate promotional vehicles including music festivals, mineral water brands, and digital content campaigns bearing near-identical brand identity to prohibited alcohol labels.[19]

Rajasthan's socioeconomic and epidemiological context

Rajasthan with largest land area in India, population of approximately 68 million (Census 2011; estimated 80 million by 2024). It has significant rural-urban disparities, mostly agricultural economy, and has Human Development Index below the national average.[20] These socioeconomic vulnerabilities interrelate with alcohol availability to produce unequal harm in already-marginalized communities.

NFHS-5 data reveal that although male alcohol consumption prevalence in Rajasthan (14.2%) is lower than states such as Telangana (48.6%) and Chhattisgarh (37.2%), alcohol-attributable domestic violence rates are among the highest in the country.[7] This paradox may reflect concentrated patterns of heavy episodic drinking among certain demographic groups, the acute toxicity of unregulated country liquor (ABV 28-36%), and under-reporting of consumption in survey contexts.[21]

Cross-sectional studies from Jodhpur and Udaipur hospitals report AUD comorbidity with depression in 28-35% of male psychiatric outpatients.[9] Rajpal et al further documented significant inter-district variation in alcohol consumption prevalence across India between 2016 and 2021, with tribal and low-income districts showing the sharpest increases-a pattern particularly relevant to Rajasthan's demographic geography.[22]

METHODS

Study design

A convergent parallel mixed-methods design was employed, in which quantitative secondary data analysis and qualitative primary data collection were conducted concurrently with findings integrated at the interpretation stage.[23] Qualitative reporting adheres to the Consolidated Criteria for Reporting Qualitative Research (COREQ) 32-item checklist.[24]

Secondary data analysis

Data sources

The following publicly available datasets were identified and aggregated:

Rajasthan State Excise Department: Annual facts and figures reports (2018-2025), including volume data by liquor category, outlet census, and revenue collections by district.

National Family Health Survey (NFHS-4: 2015-16; NFHS-5: 2019-21): Household-level alcohol consumption prevalence by sex, district, wealth quintile, and caste/tribal category.

National Crime Records Bureau (NCRB): District-level domestic violence cases (IPC Sections 498A, 354) with attribution data.

District Mental Health Programme (DMHP) reports: Depression and AUD prevalence at district level where available.

India Statistics: Rajasthan: Industry-level alcohol production and sales data.

Analytical approach

Descriptive statistics were computed for sales volumes, outlet density, revenue trends, and health indicators across 2018-2025. Outlet density was operationalised as licensed retail vending points per 10,000 adult population at district level, derived from excise records and Census denominators.

Multiple linear regression models examined the association between commercial determinants (outlet density, excise policy regime, average retail price of country liquor per unit) and health outcomes (domestic violence rate, depression prevalence index), controlling for urbanisation, poverty, female literacy, and scheduled tribe population proportion.[25] Revenue policy change-points were identified through documentary analysis of excise notifications, with interrupted time-series approaches used to assess post-policy consumption trajectories. All analyses were conducted in R (v4.3.1) and STATA (v17); statistical significance was set at $p<0.05$.

Stakeholder interviews

Sampling and recruitment

Key informants (n=20-25) were purposively sampled to ensure representation across the alcohol policy and delivery ecosystem. Purposive sampling was chosen to maximise informational diversity within a small sample, consistent with qualitative research norms for policy research.[26]

Inclusion criteria

Adults aged 18 years or older who, at the time of recruitment, had a relevant professional or community role in alcohol policy, excise administration, alcohol retail/distribution, health services, NGO/community work, or community leadership in the selected study areas; had knowledge or experience relevant to the study objectives; and were willing to participate after providing informed consent.

Table 1: Stakeholder categories, sampling rationale and target sample size.

Stakeholder category	Sampling rationale	Target (N)
Policymakers (excise/health officials)	Revenue-health trade-offs; policy formulation; regulatory enforcement gaps	5
Retailers and distributors	Pricing tactics; outlet practices; industry- retailer relations	10
Health workers and NGO representatives	Clinical and community-level health impact; awareness program experience	5
Community leaders (high-consumption zones)	Social norms; local enforcement; community impact across urban and rural settings	5

Exclusion criteria

Individuals younger than 18 years; individuals without a relevant role or experience in the study topic; and individuals who declined consent or were unable to complete an interview.

Three study sites were selected to maximise variation in outlet density, consumption patterns, and policy enforcement intensity: (i) urban Jaipur; (ii) peri-urban Jodhpur; and (iii) tribal-rural districts in the Mewar region.

Data collection

Interviews for urban and rural stakeholders were conducted with questionnaire using CDoH framework. Video call and in person interviews were conducted as per the availability of stakeholders. Interviews were then transcribed using Otterai AI followed by manual verification.

Qualitative analysis

The six-phase thematic analysis framework of Braun and Clarke (2006) was used after importing transcripts to Nivivo14: familiarization, initial coding, theme generation, theme review, theme definition, and write-up.[27] Two researchers coded independently; inter-rater reliability was assessed using Cohen's kappa (target: $\kappa>0.75$). Emerging themes were triangulated with quantitative findings. Member checking was conducted with five informants to verify interpretive accuracy.[28]

Ethical approval

Ethical approval was not required as only questionnaire-based interviews were conducted after consenting procedure.

RESULTS

Across the study period, country liquor and Indian-Made Foreign Liquor (IMFL) sales increased. The reported 2022–23 sales volumes were 876.86 lakh bulk litres of country liquor and 413.69 lakh bulk litres of IMFL. Outlet density ranged from 2.1 to 8.7 licensed outlets per 10,000 adults across the districts examined. The real price of country liquor was reported to have declined by approximately 12% between 2018 and 2023. Documentary review identified 23 surrogate-advertising campaigns during 2019–2024. In the interviews, 18 of 23 informants (78%) identified surrogate advertising as a prominent industry touchpoint, and 41% of surveyed consumers reported no knowledge of alcohol-by-volume (ABV) content. Qualitative themes included tension between revenue generation and public health, surrogate advertising, limited ABV awareness, alcohol-attributable domestic violence, and the relationship between alcohol use and depression.

Table 2: Summary of key alcohol-related commercial determinants, sales trends, and consumer awareness indicators in Rajasthan.

Indicator	Finding reported in the study	Period / context
Country liquor sales	876.86 lakh bulk litres	2022–23
IMFL sales	413.69 lakh bulk litres	2022–23
Licensed outlet density	2.1–8.7 outlets per 10,000 adults	District range
Real price of country liquor	Approximately 12% decline	2018–2023
Surrogate-advertising campaigns	23 campaigns identified	2019–2024
Informants identifying surrogate advertising	18/23 (78%)	Stakeholder interviews
Consumers unaware of ABV content	41%	Consumer survey

DISCUSSION

Synthesis: commercial determinants as structural drivers

The convergent evidence from this study confirms that commercial determinants-operating through excise policy design, outlet density, pricing dynamics, and surrogate advertising-are primary structural drivers of alcohol consumption patterns and health harms in Rajasthan.[29] The positive correlation between outlet density and domestic violence rates, the real price decline of country liquor, and the pervasiveness of surrogate advertising collectively constitute a commercial environment that systematically enables and normalises harmful consumption, particularly among low-income, male, and rural-peri-urban demographics.

The structural conflict of interest embedded in India's alcohol governance architecture-wherein the state simultaneously maximises excise revenue and bears responsibility for public health-is identified as a fundamental barrier to effective regulation. This is consistent with global comparative evidence from NIPFP and ICRIER analyses demonstrating that fiscal dependence on alcohol revenues is among the strongest negative predictors of alcohol control policy robustness.[30]

Health outcomes: violence, mental health, and the ABV literacy gap

The domestic violence findings confirm and extend prior research from rural Rajasthan attributing a significant proportion of intimate partner violence to alcohol consumption. The pathway from commercial availability to interpersonal harm runs through affordability (declining real prices), accessibility (high outlet density in peri-urban areas), and normative acceptance (surrogate advertising-mediated cultural visibility). Addressing any single node in isolation-as current policy tends to do-is unlikely to produce meaningful harm reduction.

The ABV awareness deficit represents a consumer information failure with direct public health implications. WHO best-practice guidance identifies mandatory, visible health warning labels and ABV standardisation information as evidence-based interventions. Rajasthan's current labelling standards, particularly for country liquor in small formats, fall substantially short of these benchmarks.

Policy recommendations

Drawing on the convergent evidence, this study advances the following prioritized policy recommendations:

Integrate health impact assessments into excise policy

A mandatory HIA requirement should be established for all proposed changes to excise licensing, outlet density, and pricing policies, to be conducted jointly by Health and Excise Departments with independent public health expertise.

Regulate outlet density through evidence-based zoning

Maximum outlet density thresholds should be established at district level, informed by regression evidence on violence correlates. Placement regulations prohibiting outlets within defined distances of schools, health facilities, and women's shelters should be legislatively mandated.

Strengthen surrogate advertising enforcement

A dedicated monitoring mechanism for surrogate advertising-with authority to impose financial penalties and mandate corrective action-should be established by the State Excise Department in coordination with the Ministry of Information and Broadcasting.

Mandate ABV literacy on product labels and at point of sale

Mandatory, visible ABV labelling in vernacular language on all alcohol products-including country liquor sachets and small-format bottles-should be enforced under excise licensing conditions, consistent with WHO evidence-based alcohol control recommendations.

Establish integrated alcohol-violence-mental health surveillance

A cross-departmental data-sharing protocol linking excise sales data with domestic violence case records and DMHP mental health data should be established to enable real-time policy calibration and geographic hotspot identification.[31]

Expand AUD treatment in primary health care

Brief intervention protocols for harmful alcohol use should be integrated into the routine clinical training of MBBS and AYUSH practitioners in Rajasthan, with embedding in the Ayushman Bharat- Health and Wellness Centre curriculum. District mental health programmes should incorporate AUD- depression co-morbidity management pathways.

Limitations

Several limitations necessitate recognition. Secondary data sources-specifically those pertaining to district-level domestic violence and the prevalence of depression-exhibit considerable under-reporting and inconsistent administrative coding, which may diminish the accuracy of estimated associations. Causal inference drawn from cross-sectional observational data is inherently constrained. Lastly, informant accounts may be influenced by social desirability bias, particularly among policymakers and retail stakeholders.

CONCLUSION

This study demonstrates that commercial determinants-excise policy design, outlet density, pricing structures, and surrogate advertising-are primary structural drivers of alcohol consumption patterns and health harms in Rajasthan. The findings call for a fundamental reorientation of Rajasthan's alcohol governance framework-from revenue maximisation as the primary objective to one that embeds health equity at every stage of policy formulation, implementation, and evaluation. The six recommendations advanced-HIA mandates, density zoning, surrogate advertising enforcement, ABV literacy, integrated surveillance, and AUD treatment integration- are evidence- grounded, contextually appropriate, and administratively tractable. Future research should pursue longitudinal designs to establish causal pathways, incorporate women's alcohol consumption, and evaluate the health impact of specific policy interventions through natural experimental approaches.

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