

Intoxicant Consumption Dynamics under Alcohol Prohibition: Evidence from India

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March 12, 2025

Abstract

This paper examines the effects of an alcohol prohibition law in Bihar, India, on intoxicant consumption. We implement a dynamic difference-in-difference estimation strategy using longitudinal data on monthly household expenses, exploiting state-level variation in policy exposure and household-level variation in alcohol use. We document that alcohol-consuming households in Bihar reduced their spending on tobacco products following the ban announcement, indicating complementarity between alcohol and other intoxicants; however, after its strict enforcement, when alcohol was unavailable, these households gradually increased their tobacco consumption. We find reallocation in healthcare spending: urgent medical expenses decrease with increased spending towards positive lifestyle changes.

JEL Classification: D10, D12, I10, I18, I19, H31

Keywords: Prohibition, Intoxicants, Consumption, Healthcare Expenditure

This work was supported by the Isaac Centre for Public Policy at Ashoka University. We thank Austin Smith, Abhiroop Mukhopadhyay, and Nishith Prakash for their comments. We also thank Tarang Gupta for their excellent research assistance.

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1 Introduction

The consumption of alcohol affects individual health and productivity, leading to increased mortality (Carpenter and Dobkin, 2009), workplace accidents, and absenteeism (Johansson et al., 2014; Bassols and Castello, 2018). It also impacts economic and social outcomes, including the higher incidence of fatal accidents (Levitt and Porter, 2001; Edlin and Karaca-Mandic, 2006; Bäuml et al., 2023), the prevalence of crime, and domestic violence, among others (Chikritzhs and Stockwell, 2002; Heaton, 2012; Luca et al., 2015). Similarly, smoking has negative health consequences (Akl et al., 2010; West, 2017) and for decades has been one of the leading causes of premature deaths, with low- and middle-income countries being particularly affected (Edwards, 2004; Lim et al., 2012).

The efficacy of alcohol restrictions and their impact on alcohol consumption is unclear. Minimum unit pricing (Bokhari et al., 2024) and alcohol sales bans (Petrusevich, 2024) have been shown to be effective in reducing alcohol demand in some cases; however, Bokhari et al. (2023) finds that volume bans in Scotland increased rather than reduced sales¹. Policies aimed at reducing the consumption of any intoxicant good through higher taxes, restricted sales, stricter age barriers, or complete bans can also have the consequence of reducing or increasing the consumption of other intoxicants. Higher prices for cigarettes lead to substitution in favour of alcohol (Picone et al., 2004) and smoking cessation products (Cotti et al., 2016), and a reduction in the consumption of e-cigarettes (Cotti et al., 2018)². An increase in the price of one form of alcohol leads to substitution for other forms of alcohol (Gehrsitz et al., 2021), as well as a reduction in participation in smoking (Decker and Schwartz, 2000), suggesting complementarity between them. The impact of smoking bans is mixed and can result in increased (Burton, 2024) or lower alcohol consumption (Picone et al., 2004). Survey data shows that an increase in the minimum drinking age can lead young adults to substitute marijuana for alcohol (DiNardo and Lemieux, 2001; Crost and Guerrero, 2012). Thus, a true assessment of policy

¹Avdic and von Hinke (2021) finds that increases in the regulated opening hours of Swedish alcohol retailers led to significant increases in alcohol purchases.

²This linkage in consumption is not restricted to alcohol or tobacco as Alpert et al. (2018) finds that the introduction of an opioid abuse deterrent version, OxyContin, led to increased substitution for heroin

needs not only to correctly identify the impact of the policy on the consumption of the good in question but also to establish how it may change the consumption of other related goods over time.

In this paper, we analyse the relationship between the consumption of alcohol and other intoxicants such as cigarettes, bidis³, and other forms of tobacco (subsequently referred to as CBT) by documenting the *dynamic* effects on household consumption expenditure in response to the complete prohibition of alcohol⁴. We use high-frequency longitudinal data from the Consumer Pyramid Household Survey (CPHS) to study the Bihar Amendment Act of 2016, which prohibited not only consumption, but also production, transportation, and sale of all types of alcohol in the state (Chakrabarti et al., 2024). The Act was announced on November 26, 2015, and went into effect on April 1, 2016. Such complete prohibition laws are quite rare and hence not studied adequately in the literature.

Our paper makes two significant contributions. First, we employ a difference-in-difference approach to compare Bihar with its neighbouring states, Uttar Pradesh, West Bengal, and Jharkhand. However, identifying the causal impact of the policy implemented in Bihar is challenging due to the possibility of other concurrent changes in these neighbouring states (control group) that could confound the results. Furthermore, there is a risk of violating the Stable Unit Treatment Value Assumption (SUTVA). To mitigate these issues, we complement our interstate analysis with a within-Bihar comparison. In this within-state analysis, we examine differences over time in alcohol and CBT consumption between alcohol drinkers and non-drinkers in Bihar, identified prior to the policy announcement. Our key assumption is that comparing individuals within the same state over time helps to eliminate state-level differences that may otherwise distort our findings.

³Bidi is a form of a thin, unfiltered hand-rolled cigarette, commonly wrapped in the leaves of the East Indian Ebony tree held together by a string or adhesive

⁴According to the Narcotics Drugs and Psychotropic Substances Act of 1985, the production, sale, trading, and consumption of marijuana (with the exception of bhaang, which is usually consumed only during specific religious festivals), cocaine and other forms of intoxicating drugs are prohibited in all states of India. Therefore, we refrain from analyzing the effect of the alcohol ban on the consumption of illicit drugs.

Secondly, our high-frequency monthly data reveal dynamics in the estimated effects that may be overlooked when considering only average treatment effects. Specifically, we investigate whether the announcement of the alcohol ban, as opposed to its actual implementation, leads to differential changes in alcohol and CBT consumption between the treated and control groups. We also explore whether these changes occur gradually or abruptly and whether they persist over time. Through a d-i-d analysis, our results provide insight into these questions, demonstrating that changes in CBT consumption after the alcohol ban are more dynamic and complex than simple labels of complements or substitutes would suggest.

In our analysis, we find that the estimated difference in alcohol consumption between Bihar and its neighbouring states decreases by 100 INR during the six months following the announcement of the alcohol ban and remains consistently low, indicating that the ban effectively reduced alcohol consumption in Bihar⁵. At the same time, the estimated difference in CBT consumption continues to decrease by 50 INR. However, nearly a year after the ban was implemented, the estimated difference starts to recover and the initial decline reverses at the end of our event study window. We hypothesise that three factors may explain these interstate differences: (i) complementarity between alcohol and CBT consumption, whereby a reduction in alcohol consumption initially reduces CBT consumption, followed by a shift toward CBT as alcohol remains unavailable, (ii) complementarity in the sale of alcohol and tobacco products, and (iii) social disapproval associated with addictive goods, which can change the demand for CBT after the ban announcement.

To further investigate the mechanisms behind these effects, we analyse households within Bihar with varying exposure to the ban. Using an event-study specification, we compare households that consumed alcohol (treated group) in the ten months preceding the ban announcement in 2015 to those that reported zero alcohol consumption (control group). The estimated difference in liquor consumption between the two groups is

⁵Due to the strict implementation of the ban, there is the possibility of households misreporting alcohol expenses; however, as discussed later, we provide supplementary evidence suggesting that the ban was largely successful in reducing alcohol consumption.

initially high (around 215 INR) but gradually decreases after the announcement and implementation of the ban. We find that the estimated differences in CBT consumption between the two groups are significant, with alcohol-consuming households spending 58 INR more on tobacco products prior to the ban announcement. Following the announcement and subsequent implementation of the ban, this difference decreases significantly, suggesting that alcohol-consuming households reduce their CBT consumption more than the control group. These differences persist for several months after the ban is enforced, with a slow recovery beginning nearly a year later. We then observed a gradual increase in the estimated difference as the treated group began to increase its CBT consumption, compensating for the initial decline. This indicates that alcohol-consuming households tend to move towards increased CBT consumption relative to the control group. Our analysis suggests that there is evidence of complementarity in the consumption of alcohol and other intoxicants, resulting in a greater reduction in the consumption of CBT among alcohol consumers. Once the prohibition policy is implemented and alcohol is no longer available, these households gradually increase their expenditure on other intoxicants. In general, our findings highlight that it is challenging to classify alcohol and other intoxicants as purely complementary or substitutive.

Motivated by evidence that prohibitions on intoxicant consumption have implications for health⁶, we next investigate the effect of the prohibition policy on healthcare expenses. We divide health spending into two broad categories: (a) urgent health expenses and (b) expenses related to lifestyle changes. We find that compared to other states, alcohol-consuming households in Bihar experience a decrease in urgent health expenses and an increase in expenses related to positive lifestyle changes, highlighting the benefits of reduced alcohol and CBT consumption. In our within-state analysis, relative to non-alcohol-consuming households in Bihar, the treated group experiences a decline and then an increase in urgent medical expenses, thereby mirroring the change in their CBT consumption. They also experience a relative decrease in other health expenses as their

⁶Da Mata and Drugowick (2024) showing that bans on smoking in public places in Brazil lead to a decreased exposure of pregnant women to smoking and ultimately to better birth outcomes; Petrusевич (2024) finds that alcohol sale bans can reduce alcohol consumption by parents and improve children's health outcomes

CBT consumption increases a year after the ban was implemented. In addition, we find evidence suggesting that alcohol-consuming households in Bihar increase their education spending after the ban is announced and implemented, the effects of which persist over time. To our knowledge, this is the first evidence of a shift in budget allocation from addictive goods to health and education, especially in the context of a developing economy, highlighting the wider impact of such policies.

We perform a series of robustness checks to further validate that our results identify the causal impact of the ban. The ban could cause people to move between states, which would be a problem for studies using repeated cross-sectional data, but given our panel data, we found no significant impact of migration on our results. We exclude border districts in Bihar to control for possible spillover effects from other states. Various clustering strategies, the use of consumption shares, and adjustments in the control group confirm that the alcohol ban led to a decrease in liquor consumption and changes in CBT consumption in Bihar, with consistent results from different methodologies. The rest of the paper is organised as follows. Section 2 provides background details on the liquor ban in Bihar. Section 3 offers a description of the data, while Section 4 contains the main empirical specification. Section 5 illustrates the primary results and 6 discusses some robustness checks. Finally, Section 7 concludes.

2 Background

India is a federal republic comprising 28 states and 8 union territories, where states have autonomy over deciding their liquor policies, such as minimum drinking age, sales restrictions, and excise taxes ⁷. Bihar, the third most populous state in the country (according to the 2011 Census), ranked sixth in terms of alcohol consumption, according to data from the 2011-2012 National Sample Survey Office, Chaudhuri et al. (2024). It has also recently been the only state to enforce complete liquor prohibition.⁸

⁷See Schess et al. (2023) for a review of alcohol policies in India

⁸The Indian state of Gujarat is the only other state to have a complete ban on the sale and manufacture of alcohol. However, this policy, implemented in the mid-1950s, allowed foreigners and visitors to consume while the neighbouring Union Territory of Diu continued to sell alcohol. Therefore, it does not serve as a good comparison to Bihar. Some states in northeast India, Nagaland, Manipur, and Mizoram, have

Nitish Kumar, the Bihar Chief Minister between 2005-2014, implemented policies that allowed the operation of a larger number of liquor stores in the state, resulting in an increase in alcohol consumption. As a result, as observed in Figure 1a, liquor consumption in Bihar is higher than the national average before the ban. However, in the lead-up to the state elections, in July 2015, he pledged to ban alcohol if he came to power. This move was in response to protests by women and social activists calling for prohibition, as increased alcohol consumption was seen as the leading cause behind an increase in cases of domestic abuse and intimate partner violence (IPV). Nitish Kumar fulfilled this promise by announcing on November 26, 2015, just six days after re-election, that there would be a complete ban on alcohol from April 2016. The Bihar Excise (Amendment) Bill 2016 was unanimously passed to implement the ban, which prohibited the production, sale, or consumption of all types of alcohol in the state (Singh, 2020). Strict penalties were imposed if the law was violated, including up to 10 years in prison. Manufacturers and suppliers also faced the possibility of severe penalties if deaths occurred due to the consumption of spurious liquor. The general public was encouraged to report possession or consumption of alcohol using a toll-free number that was widely advertised in the state (Chaudhuri et al., 2024). The police and the excise department worked together to carry out raids and arrests to enforce the law as strictly as possible ⁹.

Figure 1a represents the average monthly expenditure on alcohol in Bihar, its neighbouring states of Uttar Pradesh, West Bengal, and Jharkhand, and all states of India, excluding Bihar, between 2015-2017¹⁰. Initially, the average monthly liquor expenditure in Bihar is approximately 75 Indian Rupees (INR) higher than the average for the rest of India and close to 100 INR higher than the neighbouring states. Due to anticipation of the prohibition policy, we observe a small decline in average household liquor expenses in Bihar starting 3 months before the ban announcement. This coincides with the election campaign in July, in which Nitish Kumar first announced that he would implement a

imposed intermittent bans, with caveats and widespread illegal consumption being quite common.

⁹According to data from the Excise and Prohibition Department of the Government of Bihar, between April 2016 and March 2018, more than 670,000 raids were conducted, and 126,000 arrests were made with respect to alcohol-related violations.

¹⁰Neighbouring states include those that share some border with Bihar. These states also have a similar social and economic composition, with Jharkhand being a part of the former Bihar until 2001

liquor ban if he returned to office. The average household expenditure on liquor for India remains steady over time; however, we observe a sharp drop between the announcement of the ban in November 2015 and April 2016, when it was legally enforced. Contrary to the expectation that households would be incentivised to stock up on their alcohol before policy implementation, resulting in a spike in household alcohol expenses following the ban announcement, the trends may be explained by a fall in production and availability of alcohol during that time. There are potential supply-side spillovers to consumption in some of the neighbouring states, as average liquor expenses in the neighbouring states also undergo a slight fall; however, on average, household liquor expenses remain stable for the rest of the Indian states. After the ban was implemented, the average household liquor expenses in Bihar reduced further, eventually falling to zero.

Figure 1b shows the corresponding average monthly CBT consumption. The average expense on CBT in Bihar, while approximately 100 INR less than its neighbouring states, is comparable to the rest of India during the first half of 2015. We observe an almost 66% decrease in CBT expenses in Bihar in the six months between the announcement and its implementation, mirroring the corresponding decrease in alcohol expenditure. However, this effect is short-lived; a few months after the ban is enforced, CBT expenses increase steadily, almost completely reversing the initial decline. Throughout the period, the average expense of CBT in the rest of India shows a small increase; for neighbouring states, there is a decrease of less than 15%. Dynamic fluctuations in CBT consumption provide compelling evidence for further investigation into what drives these changes and how they may be related to the alcohol prohibition policy.

3 Data

We use longitudinal household-level data at the monthly frequency from the Consumer Pyramids Household Survey (CPHS) conducted by the Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE). The data covers more than 170,000 households that are surveyed repeatedly over time. Every year from 2014, data are collected in waves, where

each wave is a period of 4 months, January-April, May-August, and September-December. Each household is assigned to a specific month for an interview within each wave and subsequently interviewed again exactly four months later. Monthly time series data on household consumption and income are constructed by collecting data on income and expenses from households for each of the four months preceding the month of the interview.

Our data has some unique advantages, which makes it ideal for our analysis. Firstly, this is the only data set that consistently and comprehensively surveys a representative set of households before, during, and after the imposition of the ban in Bihar. This allows us to compare the state of Bihar (where the alcohol ban took effect) with her neighbours, Uttar Pradesh, West Bengal, and Jharkhand, and also conduct a within-Bihar analysis. Secondly, our database consists of a detailed breakdown of monthly household expenses on 153 category heads with additional details embedded for most of them. These include expenses on different food items (including alcohol and other forms of intoxicants), clothing, footwear, cosmetics, appliances, restaurants, utilities, transport, education, health, etc. We also get detailed data on the income of the household and its members collected from different sources. This helps us to control for income effects in our specification¹¹. Finally, the high-frequency nature of the data allows us to calculate dynamic difference-in-difference estimates, which helps us analyse the impact of the policy announcement, months between announcement and implementation, and the evolution post-implementation often absent in average treatment effect estimates.

Since the ban was announced in November 2015 and implemented in April 2016, we restrict our sample to include observations from January 2015 to December 2017. We observe household expenses up to ten months prior to the announcement of an impending prohibition law, the impact of the announcement, and both the immediate and subsequent effects of the ban¹². We study detailed expenses in the categories of alcohol and

¹¹There are two other data sources that measure consumption and some aspects of income in India. The long-running National Sample Survey is a cross-sectional survey. However, the last comprehensive data was released in 2011-12. The microdata from the last round in 2022-23 are still not available to the public. The other popular dataset, the Indian Human Development Survey (IHDS), although a panel, is only available for the years 2004-2005 and 2011-12

¹²While data availability in CPHS allows us to extend our analysis further, we refrain from doing

intoxicants, which include cigarettes, bidis, and tobacco (CBT). We also study the impact of the ban on healthcare expenses, broadly divided into two categories. Health expenses I, which include those that involve urgent expenses such as medicines, fees associated with doctor or physiotherapy visits, x-rays and other medical tests, and hospitalisation fees, and Health expenses II that involve lifestyle changes such as gym, yoga or dietician fees, diapers or sanitary napkins, spectacles, lenses, and other medical aid. We also look at expenses for educational activities, including spending on books, stationery, school and college fees, tuition fees, school transportation, and hobby classes. Table 1 provides some descriptive statistics on mean outcomes and demographic characteristics (later used as controls for our regression) for the state of Bihar relative to other Indian states, using both the 2011 Census and the CPHS sample that we use for our analysis¹³.

4 Empirical Strategy

We estimate the causal impact of the alcohol ban in Bihar by adopting a dynamic difference-in-difference estimation strategy, where we compare the expenditure patterns of the treated and control groups over time. The strategy is useful given the nature of the policy change, in which an impending alcohol ban was announced, followed by its implementation six months later.¹⁴ We address the challenge of identifying the effects of a state ban on alcohol consumption separately from other policy, secular, and market trends by exploiting the timing of prohibition in both an ‘between state’ and ‘within state’ scenario. We particularly focus on five sets of consumption outcomes: (i) liquor, (ii) CBT, (iii) Health Expenses-I, (iv) Health Expenses-II, and (v) Education Expenses

so because of two factors. In March 2018, there were communal riots in Bihar, which resulted in the destruction of stores and private and public property. Furthermore, due to changes in the tax structure, we observe large fluctuations in tobacco prices in Bihar between August and October 2018, which may affect CBT consumption. To isolate the effect of the alcohol ban, we restrict our analysis to December 2017.

¹³We winsorise the data to exclude outliers at 1% at each end of the distribution.

¹⁴We also calculate the average treatment effects, where we define two indicator variables, one to capture the months between announcement and implementation, and the other to capture the post-implementation period. The empirical specification and results are illustrated in A.1. However, the estimates obtained mask the dynamic changes in intoxicant consumption, especially in the case of CBT, as discussed later in Section 5, and are therefore less informative than our event study analysis

which have been described in detail in Section 3 and use the following specification:

$$\begin{aligned}
Y_{it} = & \beta_0 + \beta_1 \text{Treated}_i + \sum_{k=-2}^{-10} \gamma_{\text{pre},k} \cdot 1[D_t = -k] \times \text{Treated}_i \\
& + \sum_{k=0}^{20} \gamma_{\text{post},k} \cdot 1[D_t = k] \times \text{Treated}_i + \beta_4 X_i + \beta_5 X_{it} + \alpha_d + \alpha_t + \epsilon_{it} \quad (1)
\end{aligned}$$

Y_{it} denotes the consumption of $Y \in \{\text{Alcohol, CBT, Health Expenses-I, -II, and Education}\}$ by household i in time period t (month-year). *Treated* is an indicator variable that has a value of 1 for alcohol-consuming households in the state of Bihar. These include households that exhibited non-zero alcohol consumption between January 2015 and October 2015, that is, up to 10 months prior to the announcement of the ban; thus, these households were directly affected by the ban. Keeping the treatment group fixed, we run this regression for two different control groups. In the first exercise, we perform an interstate comparison in which the control group consists of similar households in the neighbouring states of Bihar (West Bengal, Jharkhand, and Uttar Pradesh). To further control for other state-specific time-varying factors (for example, state elections) that may affect our results, we conduct a second exercise within the state of Bihar, where the control group now comprises all households with zero alcohol consumption between January and October 2015. We control for district-fixed effects, α_d , to account for fixed cross-sectional variation between districts. This is particularly important to ensure that results are not driven by some neighbouring districts where alcohol may have been available illegally. We have time fixed effects, α_t , to account for the time-varying factors that affect all households in the given specification at the same time. For interstate comparison, standard errors are clustered at the state level. For the within-Bihar comparison, since the variation is at the household level, standard errors are not clustered in the benchmark analysis¹⁵.

Our key variables of interest include the vector of estimates given by $\gamma_{\text{post},k}$, represented graphically later in Section 5, which normalises the coefficient of October 2015

¹⁵For robustness, as discussed in A.3, we repeat the same exercise by clustering at the household level, with results remaining unchanged

(one month before the ban announcement) to zero. These estimates identify the differences between the alcohol-consuming households in Bihar and the neighbouring states and between the alcohol-consuming and non-alcoholic households in Bihar every month after the announcement of the prohibition law relative to the month prior to the announcement. Here, $\gamma_{\text{pre},k}$ captures the consumption differences between the two types of households $k \in (2, 10)$ months prior to the announcement of the ban. This specification allows us to analyse pre-trends and the evolution of the treatment effects over different points in time, with the identifying assumption being that in the absence of an alcohol ban, the consumption differences between households in the treated and control groups would have continued showing the same trends.

We control for other characteristics of the home that do not vary in time (X_i), such as religion, caste, and region, which is relevant because some religions and castes do not support alcohol consumption. Alcohol consumption patterns also vary in urban versus rural areas. We also control for a vector of time-varying covariates (X_{it}), which include family size, total income, and education level of the household¹⁶. Controlling income is vital because we use expenditure data and because alcohol consumption (and its inaccessibility) can affect the productivity of household members, which in turn can affect the consumption of CBT and health through the income channel (Johansson et al., 2014).

Potential Threats to Identification: Our analysis relies on survey data where households report their monthly consumption. If households under-report their alcohol expenses when the prohibition policy is in place due to fear of imposed penalties, it may bias our estimates. In addition, bans can lead to increased sales in the black market (Kumar and Prakash, 2016), which can compensate for the unavailability of the market. There may also be the entry of illegal alcohol from neighbouring states and the possible consumption of home-brewed alcohol (Aggarwal et al., 2025). However, as observed in Figures 1a, the decline in alcohol consumption is observed primarily after the announcement of the ban, during the six months prior to its implementation, which could be due to

¹⁶We use the variable that denotes the education group that a household is classified into, which is a categorical variable constructed by CPHS based on the education levels of all members of the household

a decrease in supply due to anticipation of the imminent ban. Given that penalties were not imposed until April 2016, households would not have had an incentive to lie about their alcohol expenses during these six months. According to a pilot study conducted by [Agarwal et al. \(2017\)](#), in which relatives of alcohol users were interviewed in three blocks of Bihar, they found a 64% reduction in alcohol usage after the ban. Women reported that after the ban, men invested more time at home and had more resources available to spend on household goods. [Dar et al. \(2024\)](#) finds the Bihar alcohol ban has been effective in reducing alcohol spending and improving the learning outcomes of school-going children in Bihar, and [Krishnatri and Vellakkal \(2024\)](#) finds that the alcohol ban in Bihar has been effective since it increased nutritional intake in households in Bihar. Similarly, [Dixit et al. \(2023\)](#) and [Debnath et al. \(2023\)](#) find evidence of a decline in cases of intimate partner violence, as men were less likely to consume alcohol after the ban. [Chaudhuri et al. \(2024\)](#) finds a reduction in crime in Bihar after the ban, which they believe is due to a reduction in alcohol consumption. This provides additional evidence that the ban has had some success in reducing alcohol consumption. Given the anecdotal and literature-based evidence on the efficacy of the ban, our identification assumption is that the ban reduced alcohol consumption, even if not completely to zero (in the event that some of the decline was misreported). Given our assumption, we focus on the impact of reduced alcohol consumption on CBT expenditure and its subsequent effect on health and education. Households have absolutely no reason to lie about or under-report CBT expenditure. Most studies compare Bihar to neighbouring states to analyse the impact of the ban, which may violate the SUTVA assumption if there was an increase in illegal alcohol consumption in Bihar and the potential spillover effects on neighbouring states. To alleviate these concerns, in addition to undertaking an interstate comparison, we also look at changes within Bihar. We compare pre-ban alcohol drinkers to non-drinkers and observe the difference in their CBT consumption over time. As long as there is some deterrence in alcohol consumption, our within-Bihar estimates can be trusted to reveal if there are complementarities in the consumption of such intoxicants.

5 Results

We estimate the effect of the alcohol ban first on liquor consumption and then on CBT, health, and education expenses of households using the event study specification presented in equation (1) and plot the estimated coefficients, $\hat{\gamma}_{pre,k}$ and $\hat{\gamma}_{post,k}$ for the different exercises.

5.1 Bihar vs. neighbouring States

Figure 2a shows the estimated difference in monthly household liquor expenses in the interstate comparison. As the ban was announced, alcohol-consuming households in Bihar reduced their liquor consumption significantly compared to neighbouring states. Liquor consumption for the treated group decreased by 100 INR compared to the control relative to the baseline (October 2015) before April 2016, when the ban was implemented. Alcohol consumption in Bihar falls further and remains persistently lower throughout our event study window, suggesting strict implementation of the ban.

Next, we study the implications of reduced alcohol expenditure on the consumption of other intoxicants. Figure 2b shows the estimated difference in monthly CBT consumption between Bihar and the neighbouring states. Bihar exhibits higher CBT consumption than the neighbouring states at the start of the analysis relative to the baseline, the differences being statistically insignificant for three months prior to the ban announcement. After the announcement of the ban, Bihar households gradually reduced their CBT consumption, with the estimated difference compared to neighbouring states falling by 50 INR relative to the baseline up to the ban implementation. After the ban, the differences in CBT consumption remain stable for one year. However, unlike liquor expenses, households in Bihar increase their CBT consumption at a higher rate than their counterparts in neighbouring states, and the initial decline completely reversed a year after the ban.

Dynamic analysis is therefore crucial, as static difference-in-difference estimates can incorrectly estimate the effectiveness of the policy on overall intoxicant and CBT consumption. The decrease and eventual increase in CBT could be explained by multiple

factors: (i) a complementarity channel through which a reduction in alcohol consumption also reduces CBT consumption initially, followed by a reduction in this effect leading to increased CBT consumption, (ii) a complementarity in sale, which leads to lower production of both liquor and tobacco products after ban announcement, and (iii) changing societal perception towards addictive goods, which leads to changes in the demand for tobacco products as well.

5.2 Within Bihar comparisons

Interstate comparison using our event study specification, although useful, cannot distinguish our treatment of interest, the Bihar alcohol ban, from other variations at the same state time frequency. These include changing market conditions, supply of alcohol, and social disapproval of intoxicants. To eliminate these plausible threats to identification, we now restrict our analysis to comprise only households *within Bihar*. We define our *treatment* and *control* groups based on alcohol consumption before the announcement of the ban. Our treatment group consists of households that consume alcohol, and the control group consists of all households that did not consume alcohol in the ten months prior to the ban announcement¹⁷. Thus, we utilise household-level variation in exposure to the alcohol ban¹⁸.

Figure 3a illustrates the results. We find that the average monthly expense for alcohol was 215 INR for treated households in the baseline month of October 2015, compared to 0 for the control group. The estimated differences for the pre-announcement months are small relative to the baseline. Following the ban announcement in November 2015, the estimated difference decreased by 177 INR over the next 5 months, even before the ban implementation. With the ban in place, alcohol consumption decreases further; the estimated difference between the two sets of households effectively reduces to 0. The CBT consumption gap between the treatment and control groups shows a U-shaped pattern. Before the ban announcement, alcohol-consuming households spend 58 INR more on

¹⁷The average expenditure on alcohol and CBT over time for both the treated and control group in Bihar are available in Figure 13 in the Appendix

¹⁸Anger et al. (2011) finds evidence that smoking bans can have heterogeneous effects on smoking behaviour of households depending on their exposure to public smoking restrictions

CBT than others, suggesting that alcohol and CBT are complements in consumption. As seen in Figure 3b, following the announcement, consistent with the complementarity hypothesis, the estimated differences in CBT consumption between the two types of households were reduced by 100 INR over the next year, as households also reduced their alcohol consumption. However, a year after ban implementation, the estimated differences begin to increase (by 50 INR at the end of our analysis period). The results are driven by a higher increase in CBT expenses for alcohol-consuming households relative to non-alcohol-consuming ones¹⁹.

This exercise also allows us to isolate the mechanism that explains the dynamics of CBT consumption. We reconsider the factors that may contribute to the results we observe for intoxicant consumption. The results of Figure 3 indicate that while the supply of CBT products may have decreased, the changes in the societal disapproval of addictive goods may have led to a reduction and subsequent increase in CBT consumption, *both* sets of households, being in the same state, would be subject to these changes. The differential fall in CBT consumption between the two types of households in the early part of our analysis indicates that the complementarity channel between alcohol and CBT consumption dominates after the announcement of the ban. However, approximately a year after the ban was implemented, CBT consumption in all households increases, the change being higher again for the treated group. This indicates that households that are predisposed to addictive goods eventually switch to other forms of intoxicants, such as CBT, when alcohol is unavailable.

5.3 Effect on Health and Education Expenses

Drinking alcohol and smoking any form of tobacco has health implications and thus impacts healthcare expenses. Therefore, the prohibition law, by influencing changes in liquor and CBT consumption, can also impact the healthcare expenses of households. When households stop spending on addictive goods, they have more resources to spend

¹⁹As a robustness check, we also restrict our analysis to districts in Bihar that do not share borders with neighbouring states to address the concern that households could continue to purchase alcohol from neighbouring states. The results, as illustrated in Figure 11, are found to be similar to the benchmark case.

on other goods, including healthcare. Thus, these could lead to lifestyle changes that can change long-term health outcomes and the corresponding expenses. However, the consumption of alcohol and other intoxicants can have a detrimental effect on health (Levitt and Porter, 2001; Carpenter and Dobkin, 2009); therefore, a ban can positively impact the health levels of households, particularly those who consumed alcohol before the ban. This can result in a decrease in urgent medical expenses associated with diseases and accidents, among others. An alcohol ban can also affect the productivity of household members, which in turn can impact health through the income channel (Johansson et al., 2014). In addition, social disapproval for tempting goods may incentivise households to lead a healthier lifestyle. As discussed before, we categorise these expenses into two groups: Health expenses I, which are related to urgent medical needs, and Health expenses II, which encapsulate lifestyle changes. Figure 4 demonstrates the results of the event study exercises for both interstate comparisons and our analysis within Bihar.

We observe in our interstate comparison a decrease in Health Expenses-I and a slight increase in Health Expenses-II (although statistically insignificant) when the ban is in effect. This suggests a lower consumption of liquor that leads to better health over time due to a decrease in spending on medicinal drugs, hospitalisation, etc. The estimated differences in urgent medical expenses between Bihar and its neighbouring states reduce by almost 100 INR relative to October 2015. When we compare households within Bihar, we find that overall health expenses for alcohol-consuming households are higher than for non-alcohol-consuming households, which could indicate poor health before the ban was announced. However, after the ban comes into effect, this gap decreases. Similarly to the change in CBT consumption, the gap in Health Expense-I increases again a year after the ban, while for Health Expense-II, it continues to fall (broadly). These results are different from the results of the interstate event study, since the control group in the other states continues to consume alcohol. Within Bihar, since our control group consists of those who never consumed alcohol, we see that urgent health expenses for the treated group mirror the change in their consumption of CBT, and expenses towards positive lifestyle changes continue to decrease as the CBT expense increases a year after the ban is implemented.

Together, these results suggest that the effect of alcohol on health appears to dominate the effect of other intoxicants.

We conducted similar event study exercises for the average educational expenses of households. Figure 5 illustrates the results. When we compare the households consuming alcohol in Bihar with those in neighbouring states, we find a minor increase in educational expenses for the treated households following the ban announcement relative to the neighbouring states; however, these differences are not statistically significant. Compared to other households in Bihar, alcohol-consuming households invest more in educational expenses after the ban (between 100-200 INR relative to the baseline).²⁰ This evidence suggests a reallocation of resources within households in Bihar when they change their spending on intoxicants, which also appears to be closely followed by neighbouring states.

6 Robustness Checks

We establish the robustness of our estimates by performing several checks. A possible concern, given the heavy penalties and the absolute ban on alcohol, is that people may migrate out of the state. In addition, the ban on alcohol production in the state may lead to migration due to labour market reasons. To check if our results are sensitive to concerns about migration, in our first robustness exercise, we restricted our sample to households in Bihar surveyed throughout our study.²¹ We do not find our results sensitive to this, as presented in Figure 6. Given the spillover effects of the ban that we see in neighbouring states and the possibility of violating the SUTVA assumption, we instead compare Bihar with all other states in India. The results are presented in Figure 7. We find a decrease in liquor consumption in Bihar compared to the rest of the Indian states after the announcement and implementation of the ban. The results of CBT consumption exhibit a pattern similar to our previous exercises; however, the standard errors of the estimates are large, given the wide variation in tobacco consumption between

²⁰This corroborates the evidence from the literature, where Dar et al. (2024) find improvements in the learning outcomes of children in Bihar after the ban comes into place.

²¹Migration away from the state may explain why our confidence intervals are larger in the inter-state comparison as we move away from the ban implementation month.

states. We also use consumption shares of total expenditure instead of actual expenses in our difference-in-difference estimate to account for households re-optimizing their budget allocation due to the ban. Our results remain similar, with slightly narrower confidence intervals, as presented in Figure 8.

In our next exercise, we modify the treatment group to include only those households that show positive levels of alcohol consumption every month between January and October 2015, increasing our control group by including some households that consume alcohol. We do not use this as our baseline specification to avoid partial treatment effects in our control group. We reassuringly find that the results are in line with those in Figures 2 and 3. We also use this broader classification of the control group for our interstate comparisons. The results are shown in Figure 9. Since our interstate comparison clusters the standard errors at the state level, we try an alternate clustering strategy at the state-time level, and the results retain their significance. We do not cluster our standard errors for the within-Bihar analysis. However, to allow the unlikely possibility that treatment is correlated between groups, we cluster our standard errors at the household level, and we do not see different results, as illustrated in Figure 10. To avoid biasing our estimates due to access to liquor from neighbouring states, we also conduct another check by excluding from our within-Bihar analysis those districts in Bihar that share their border with neighbouring states. This helps us to have a treated group that is much less likely to get alcohol from other states. The results illustrated in Figure 11 are consistent with our benchmark analysis. Finally, in a simple difference-in-difference exercise, we show how CBT prices in Bihar do not undergo distinguishable changes or fluctuations in our event study window that may bias our results (Figure 12).

7 Conclusion

In this paper, we study the evolution of the relationship between alcohol and CBT consumption after the alcohol prohibition law in the Indian state of Bihar in 2016. We use longitudinal data on monthly consumption to implement a dynamic difference-in-

difference exercise where we conduct both an interstate and within-state comparison between households based on their exposure to the ban. Between alcohol-consuming households in Bihar and its neighbouring states, in response to the ban announcement, the estimated differences in monthly liquor expenses fall, while for CBT, there is a fall and a subsequent rise.

Our second empirical strategy compares the alcohol-consuming households in Bihar with all other households in the state and finds similar results. We conclude that while supply-side factors and changing societal perceptions toward addictive goods may contribute to this change, preferences between alcohol and CBT consumption remain the dominant factor in explaining consumption changes after the prohibition policy. Our study indicates that households perceive alcohol and CBT as complementary when both goods are available; alcohol drinkers consume higher amounts of CBT, and after the ban reduces alcohol consumption, we see a significant fall in CBT consumption for this group. However, after a few months of the ban, we find evidence that CBT consumption again starts to increase, especially for alcohol drinkers. Our study, therefore, highlights the importance of using dynamic analysis with high-frequency data to accurately investigate the impact of prohibition laws.

We also show evidence of lower urgent medical expenses and higher expenses for activities and products that indicate a positive change in lifestyle in response to the ban; however, an eventual increase in CBT consumption dampens some of these changes. We also find a higher spending on education by alcohol-consuming households in Bihar after the ban.

8 Data Availability

The data used are proprietary in nature. Ronit Mukherji received data access through the Centre for Economic Data and Analysis (CEDA) at Ashoka University.

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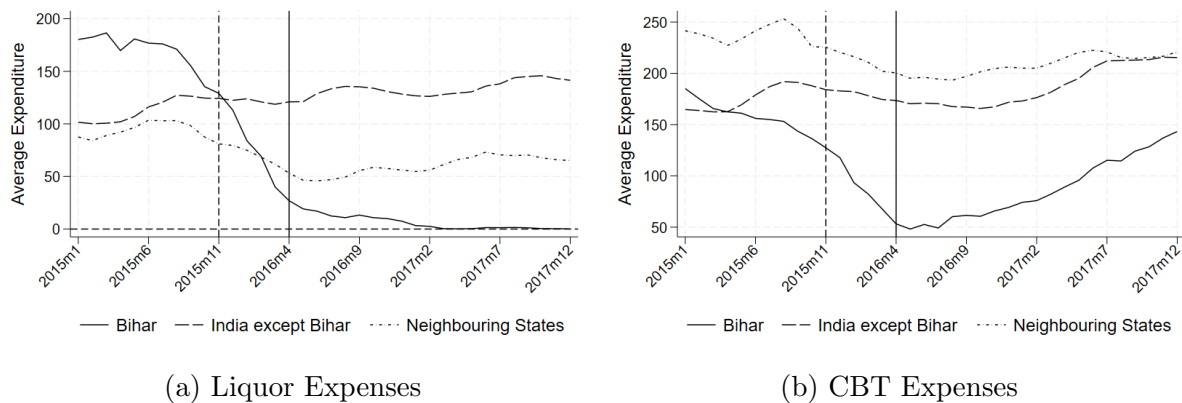
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Table 1: Summary Statistics

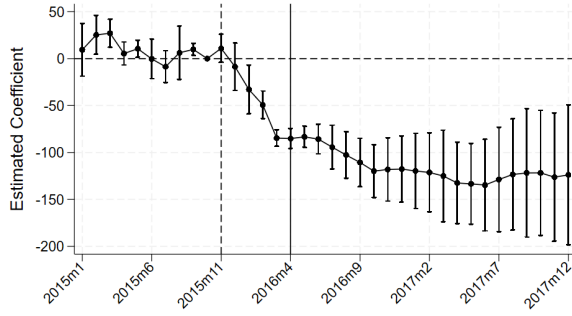
Variable (mean)	Bihar	Neighbouring States	All India	Source
<i>Demographic Characteristics</i>				
Population	104,099,452	324,076,590	1,210,854,977	Census, 2011
<i>Age(%):</i>				
0-18	47.83	42.47	38.98	Census, 2011
19-24	9.08	10.72	10.92	Census, 2011
25-64	38.17	41.25	44.24	Census, 2011
65+	4.51	4.97	5.46	Census, 2011
Family Size	4.393666	4.436544	4.179941	CPHS
<i>Religion and Caste(%):</i>				
Hindu	86.529	85.277	85.103	
SC	19.746	22.695	18.337	CPHS
ST	0.197	2.249	5.101	CPHS
Upper Caste	18.497	35.852	31.002	CPHS
OBC	48.071	24.477	31.103	CPHS
Muslim	13.471	13.861	9.767	CPHS
<i>Region(%):</i>				
Urban	66.087	68.531	70.446	CPHS
Rural	33.913	31.469	29.554	CPHS
<i>Other Economic Indicators:</i>				
Sex Ratio	918	936	940	Census, 2011
Literacy Rate (%)	61.80	70.11	74.04	Census, 2011
<i>Average Monthly Household Consumption (in INR)</i>				
Liquor	146.7215	81.69791	109.0791	CPHS
CBT	136.0652	219.0099	173.6987	CPHS
Health Expenses-1	41.83422	93.88968	68.55887	CPHS
Health Expenses-2	35.21682	57.59393	86.594	CPHS
Education Expenses	311.8428	412.7895	353.3107	CPHS
Total Expense	6808.429	8471.364	9024.207	CPHS
Total Income	9599.63	11086.85	13177.98	CPHS
Sample Observations	75184	316110	1237746	

Notes: The means reported from CPHS are weighted and calculated based on pooled data over ten months, from January 2015 to October 2015, before the alcohol ban announcement was made. Here, the sex ratio is defined as the number of women per 1000 men; the literacy rate is defined by the percentage of the population aged 7 and above who can read and write. CBT is an acronym for cigarettes, bidis, and tobacco. SC, ST, and OBC are acronyms for Scheduled Caste, Scheduled Tribes, and Other Backward Castes, respectively. In our sample, 9138 unique households are surveyed in Bihar, out of which 5381 are alcohol consumers, whereas 3757 do not consume alcohol up to 10 months prior to the ban announcement. Similarly, 16887 alcohol-consuming households are unique in the neighbouring states. We winsorise the data to exclude outliers at 1% and 99%.

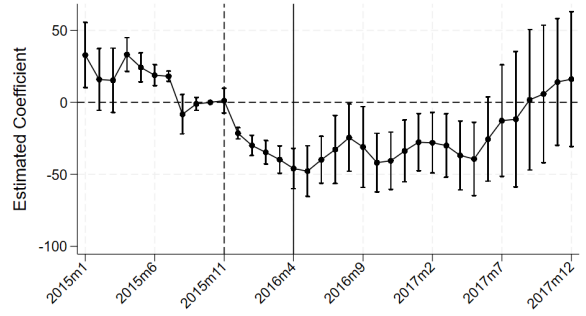


Notes: This series comes from the Consumer Pyramids Household Survey (CPHS). Panel (a) plots the average monthly expenses for liquor in the Indian state of Bihar, its neighbouring states, including West Bengal, Jharkhand, and Uttar Pradesh, and all Indian states except Bihar (ROI); panel (b) plots the average monthly expenses for cigarettes, bidis, and other tobacco (CBT) in Bihar, its neighbouring states, and the rest of India. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 1: Average Monthly Expenditure on Liquor and CBT



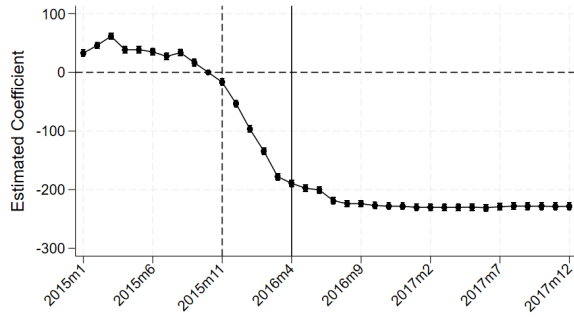
(a) Alcohol Consumption



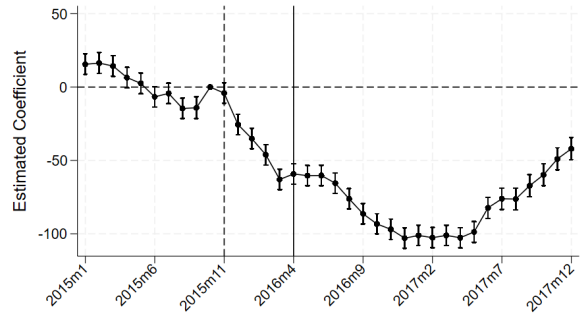
(b) Cigarettes, Bidis, Tobacco

Notes: Each graph includes point estimates from the event study exercise (normalised to 0 in October 2015) comparing alcohol-consuming households in Bihar with the neighbouring states. Regressions include district-fixed effects and time (month \times year) fixed effects and are weighted to be representative at the state level. The confidence intervals are at the 95 percent level and are adjusted for state-level clustering. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 2: Interstate Event Study Results for Intoxicant Consumption



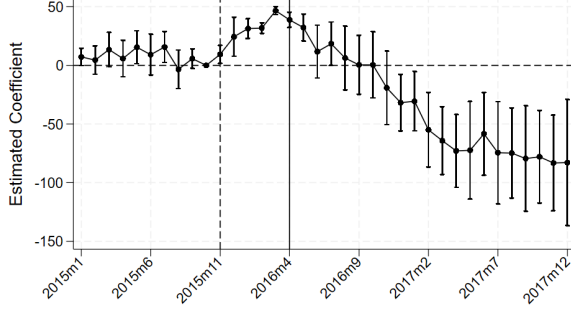
(a) Alcohol Consumption



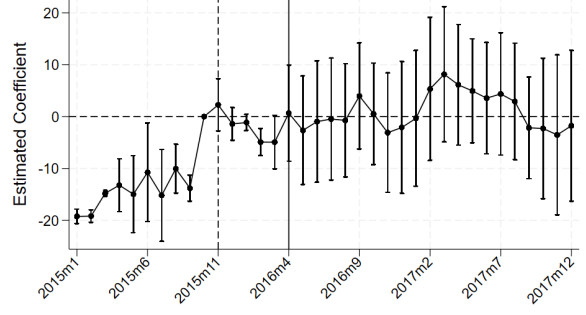
(b) Cigarettes, Bidis, Tobacco

Notes: Each graph includes point estimates from the event study exercise (normalized to 0 in October 2015) comparing alcohol-consuming and non-alcohol-consuming households in Bihar. Regressions include district-fixed effects and time (month \times year) fixed effects and are weighted. The confidence intervals are at the 95 percent level. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

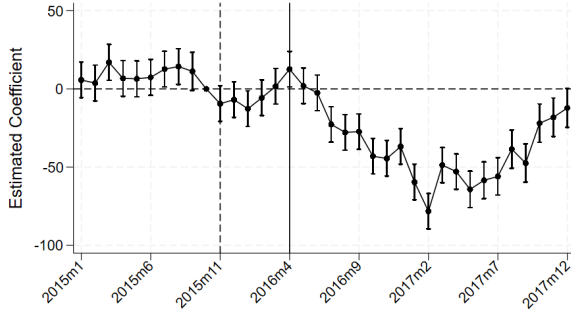
Figure 3: Event Study Results for Intoxicant Consumption within Bihar



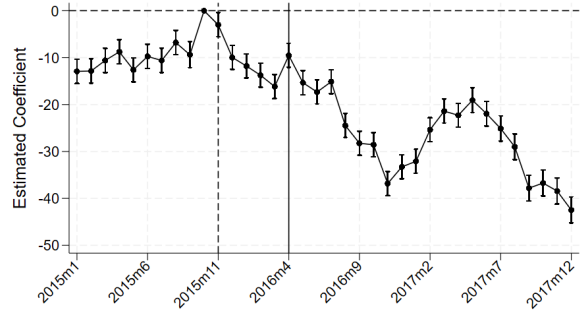
(a) Interstate: Health Expense-I



(b) Interstate: Health Expense-II



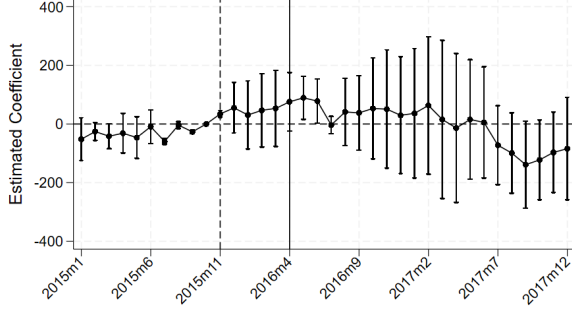
(c) Within Bihar: Health Expense-I



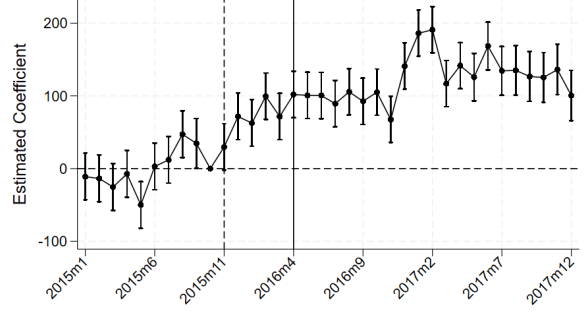
(d) Within Bihar: Health Expense-II

Notes: Each graph includes point estimates from the event study exercise (normalised to 0 in October 2015). Panels (a) and (b) show the interstate comparisons, whereas Panels (c) and (d) show the comparisons between alcohol and nonalcohol consuming households in Bihar. Health expenses I include medicines, fees associated with doctor or physiotherapy visits, X-rays, and other medical tests, and hospitalisation fees, and Health expenses II include expenses on gym, yoga, or dietician fees, diapers or sanitary napkins, spectacles, lenses, and other medical aid. Regressions include district-fixed effects and time (month \times year) fixed effects and are weighted. The confidence intervals are at the 95 percent level. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 4: Event Study Results for Health Expenses



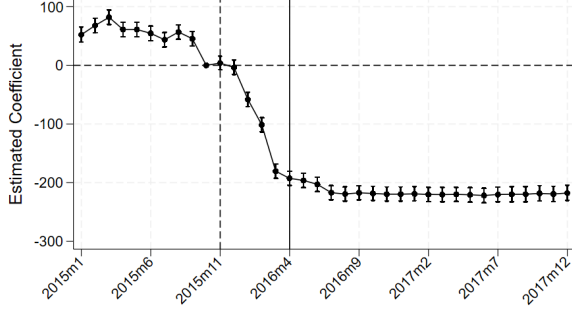
(a) Interstate Comparisons



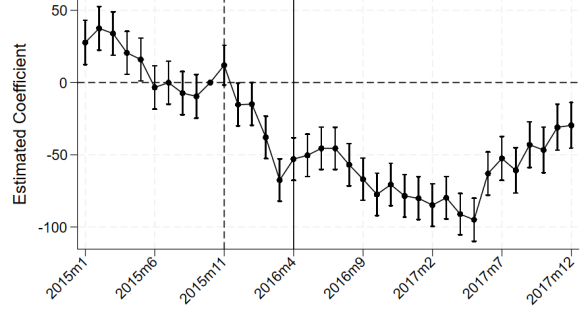
(b) Within Bihar comparisons

Notes: Each graph includes point estimates from the event study exercise (normalised to 0 in October 2015). Panel (a) shows the interstate comparisons, whereas Panel (b) shows the comparisons between alcohol and non-alcohol-consuming households in Bihar in terms of education expenses. Regressions include district-fixed effects and time (month \times year) fixed effects and are weighted. The confidence intervals are at the 95 percent level. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 5: Event Study Results for Education Expenses



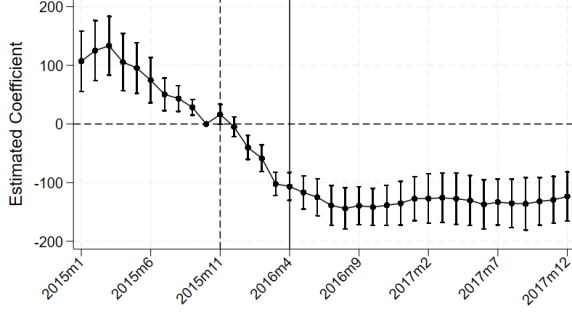
(a) Alcohol Consumption



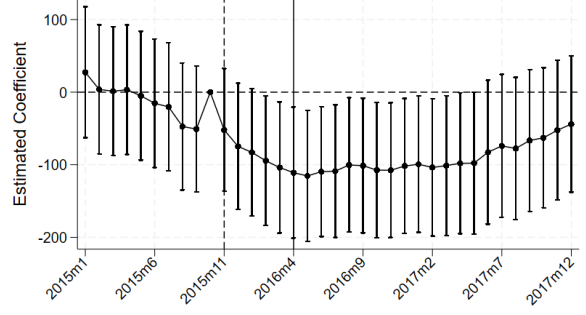
(b) Cigarettes, Bidis, Tobacco

Notes: We use a balanced panel to control for the changing composition of households in our sample due to policy-induced migration. Each graph includes point estimates from the event study exercise (normalised to 0 in October 2015) comparing alcohol-consuming and non-alcohol-consuming households in Bihar. Regressions include district fixed effects and time (month \times year) fixed effects and are weighted. Confidence intervals are at the 95 percent level. 2218 unique households were included in the sample, out of which 1651 were in the treatment group, whereas 567 were in the control group. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 6: Event Study Results for Intoxicant Consumption within Bihar: Balanced Panel



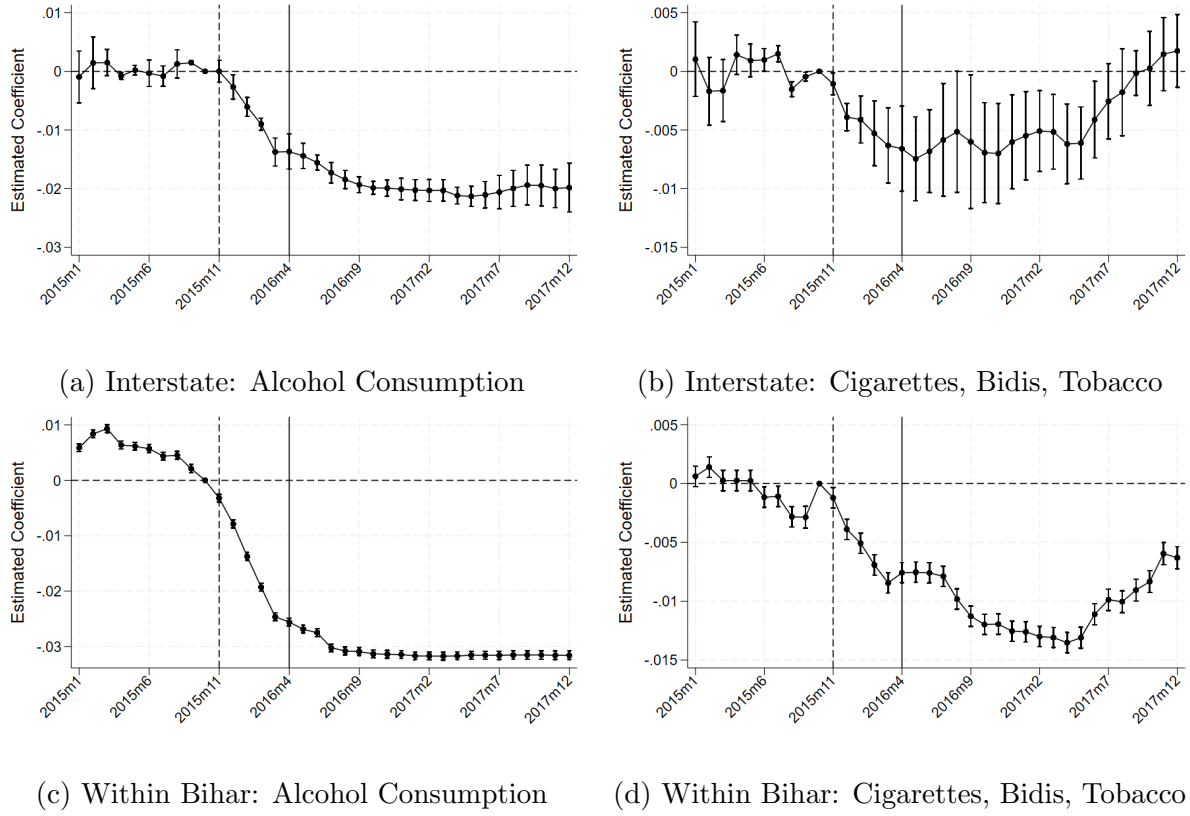
(a) Liquor Expenses



(b) CBT Expenses

Notes: We conduct placebo tests where, for the interstate comparisons, we compare alcohol-consuming households in Bihar with those in the rest of India. Each graph includes point estimates from the event study exercise (normalised to 0 in October 2015). Regressions include district fixed effects and time (month \times year) fixed effects and are weighted to be representative at the state level. Confidence intervals are at the 95 per cent level and are adjusted for state-level clustering. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 7: Event Study Results for Intoxicant Consumption: Placebo Tests



Notes: To understand how these households optimize and reallocate their resources, we investigate consumption shares instead of monthly expenses. Each graph includes point estimates from an event study exercise (normalised to 0 in October 2015). Panels (a) and (b) show the interstate comparisons between alcohol-consuming households, whereas Panels (c) and (d) show the comparisons between alcohol-consuming and non-alcohol-consuming households in Bihar. Regressions include district fixed effects and time (month \times year) fixed effects and are weighted to be representative at the state level. Confidence intervals are at the 95 percent level, and the interstate comparisons are adjusted for state-level clustering. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 8: Event Study Results for Intoxicant Consumption: Consumption Shares

A Supplementary Analysis

A.1 Average Treatment Effects

We use the following empirical specification to estimate the average treatment effects following the ban announcement and its subsequent implementation.

$$Y_{it} = \beta_0 + \beta_1 \text{Treated}_i + \gamma_{\text{ann}} \text{Post}_1 \times \text{Treated}_i + \gamma_{\text{ban}} \text{Post}_2 \times \text{Treated}_i + \beta_4 X_i + \beta_5 X_{it} + \alpha_d + \alpha_t + \epsilon_{it} \quad (2)$$

where Post_1 is a dummy that indicates the post-announcement but pre-implementation period, where Post_2 represents an indicator that takes a value of 1 post the ban implementation. The results are listed below.

Table 2: Average Treatment Effect - Within Bihar

	(1)	(2)	(3)	(4)
	Alcohol	CBT	Health Expense 1	Health Expense 2
Treated	268.8*** (345.46)	32.52*** (31.11)	10.68*** (6.80)	-2.104*** (-5.55)
post=1 \times Treated	-154.6*** (-125.60)	-15.11*** (-9.13)	-17.12*** (-6.89)	5.836*** (9.73)
post=2 \times Treated	-269.9*** (-314.58)	-48.57*** (-42.12)	-32.95*** (-19.02)	-6.018*** (-14.40)
Observations	259229	259229	259229	259229
R^2	0.574	0.219	0.061	0.272

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

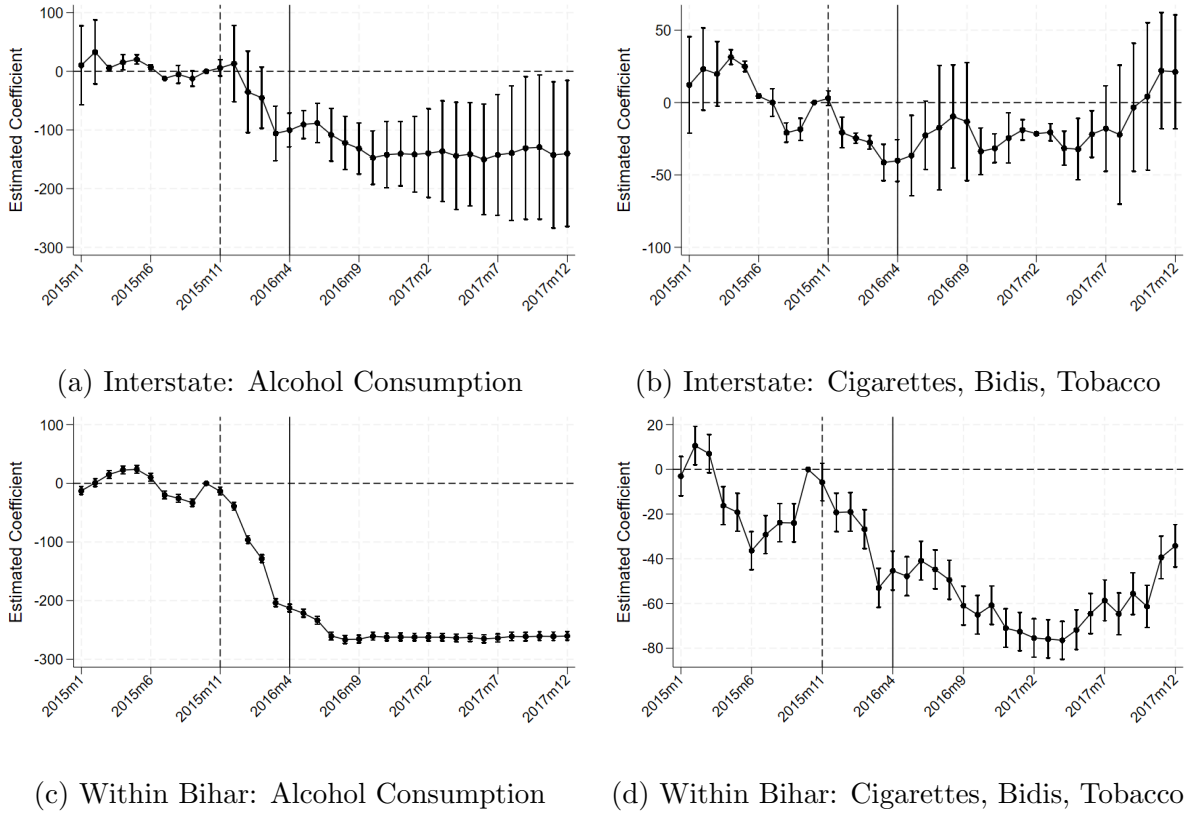
Table 3: Average Treatment Effect (Bihar vs Neighboring States)

	(1)	(2)	(3)	(4)
	Alcohol	CBT	Health Expense 1	Health Expense 2
post=1 \times treated=1	-82.72*** (-47.90)	-33.42* (-3.46)	28.36* (3.43)	11.75* (4.94)
post=2 \times treated=1	-153.9*** (-16.12)	-40.35 (-2.79)	-34.31 (-1.90)	17.43 (2.24)
Observations	645324	645324	645324	645324
R^2	0.303	0.324	0.173	0.227

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

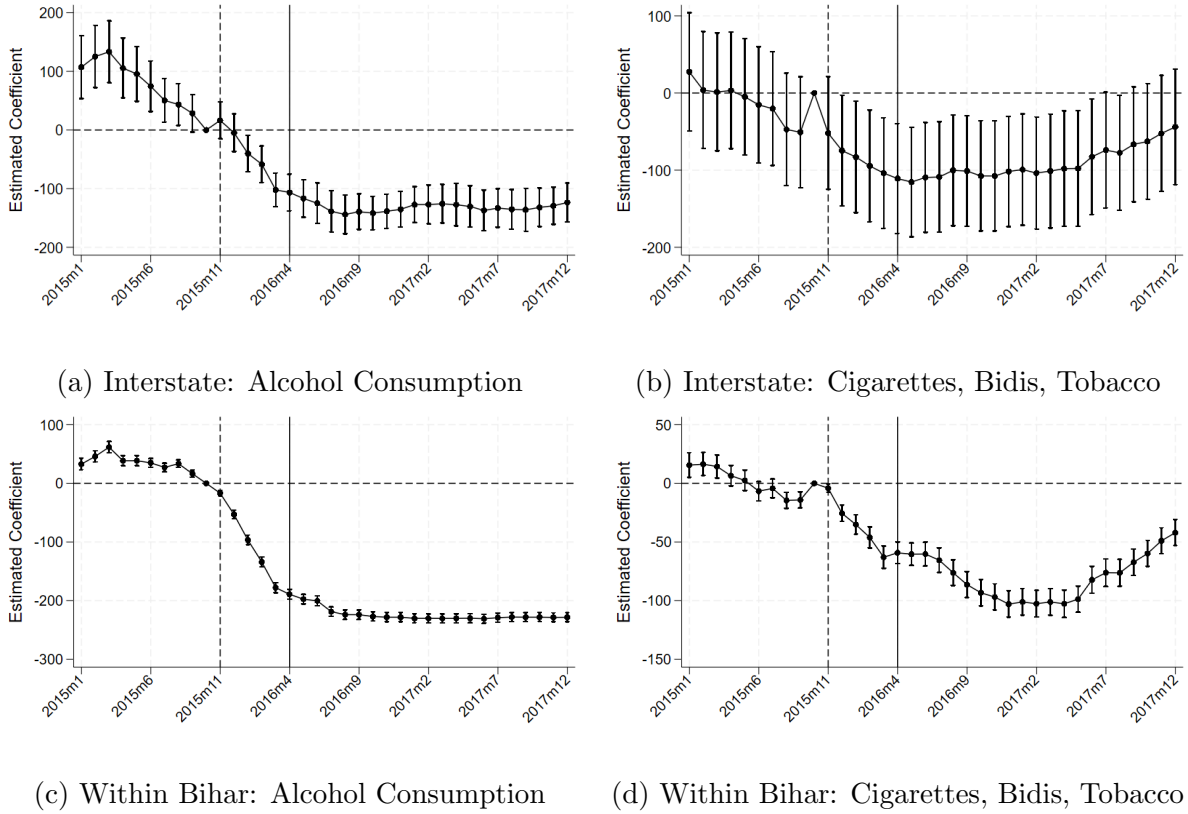
A.2 Definitions of Treated and Control Groups



Notes: We use a *stricter* definition for alcohol-consuming households to include those that incurred positive expenses on alcohol in *all* ten months prior to the announcement of the alcohol ban (January-October 2015) to validate that our definition of the benchmark exercise is robust. Each graph includes point estimates from an event study exercise (normalised to 0 in October 2015). Panels (a) and (b) show the interstate comparisons between alcohol-consuming households, whereas Panels (c) and (d) show the comparisons between regular alcohol consumers and other households in Bihar. Regressions include district fixed effects and time (month \times year) fixed effects and are weighted to be representative at the state level. Confidence intervals are at the 95 percent level and the interstate comparisons are adjusted for state-level clustering. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 9: Event Study Results for Intoxicant Consumption: Stricter Definition

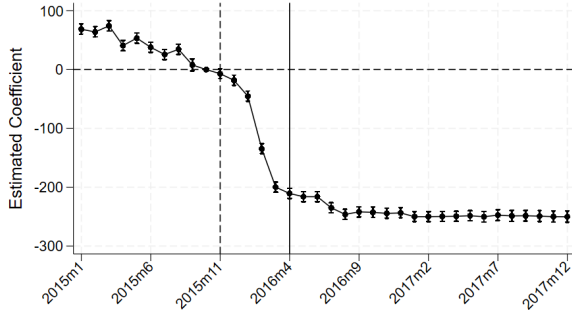
A.3 Clustering



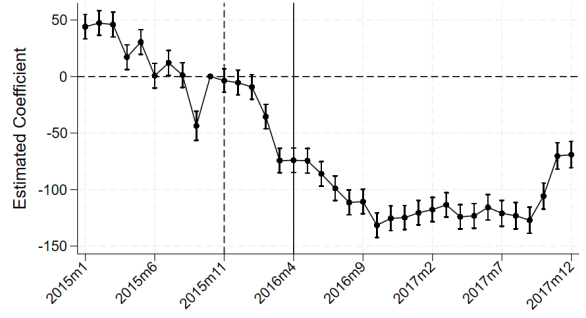
Notes: We use alternative clustering approaches for robustness. Each graph includes point estimates from an event study exercise (normalised to 0 in October 2015). Panels (a) and (b) show the interstate comparisons between alcohol-consuming households, with standard errors clustered at the *state-time level*; Panels (c) and (d) show the comparisons between alcohol-consuming and non-alcohol-consuming households in Bihar, with standard errors clustered at the *household level*. Regressions include district fixed effects and time (month \times year) fixed effects and are weighted to be representative at the state level. Confidence intervals are at the 95 percent level. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 10: Event Study Results: Alternative Clustering

A.4 Without border districts of Bihar



(a) Alcohol Consumption

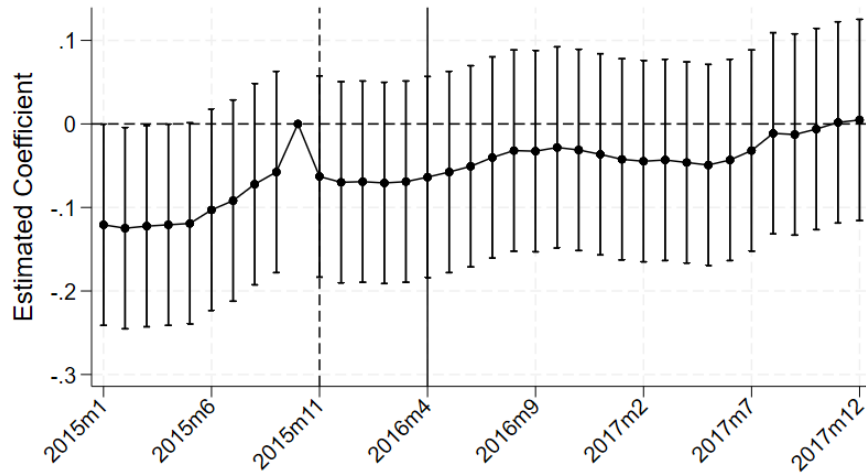


(b) Cigarettes, Bidis, Tobacco

Notes: Each graph includes point estimates from the event study exercise (normalised to 0 in October 2015) comparing alcohol-consuming and non-alcohol-consuming households in Bihar, excluding those districts that share a border with the neighbouring states of Jharkhand, West Bengal, or Uttar Pradesh. This is done considering that those members who live close to the border of neighbouring states may end up having access to liquor by crossing the border, thereby biasing our estimates. Regressions include district fixed effects and time (month \times year) fixed effects and are weighted. Confidence intervals are at the 95 percent level. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 11: Event Study Results within Bihar: Excluding border sharing districts

A.5 Prices

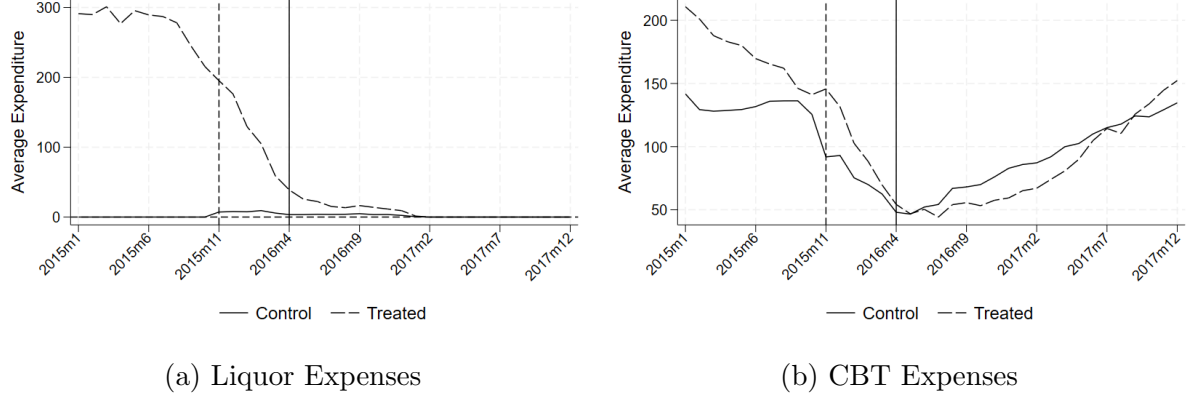


Notes: Each graph includes point estimates from the event study exercise (normalised to 0 in October 2015) comparing Bihar prices for Pan, Tobacco, and Other Intoxicants (treated) to All India (control). Confidence intervals are at the 95 percent level. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively. This series comes from the Ministry of Statistics and Program Implementation, Government of India.

Figure 12: Event Study Results for Prices

B Additional Figures

B.1 Raw trends for Within Bihar



Notes: This series comes from the Consumer Pyramids Household Survey (CPHS). Panel (a) plots the average monthly expenses on liquor in the Indian state of Bihar for its alcohol-consuming (treated) and non-alcohol-consuming (control) households; Panel (b) plots the average monthly expenses on Cigarettes, Bidis, and other Tobacco (CBT) in Bihar for the same set of households. The dotted and bold vertical lines represent the months when the ban announcement was made (November 2015) and when it was implemented, April 2016, respectively.

Figure 13: Average Monthly Expenditure on Liquor and CBT within Bihar