Unintended Consequences of Alcohol Prohibition Policies on Human Capital Investments in Children: Evidence from India

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Abstract

This paper examines the impact of alcohol prohibition policies on child educational outcomes using the variation in location, timing, and intensity of alcohol prohibition laws across different states in India. I find that the imposition of complete alcohol bans resulted in an increase of 0.28 years of schooling, while partial bans that prohibited only cheaper varieties of alcohol resulted in a reduction of -0.23 years on average among individuals who were exposed to these bans during *in utero*, infancy, preschool or school-going age (0 - 18 years of age). There is wide heterogeneity in the impact across urban and rural samples, with both types of policies having a stronger impact in the rural areas. Partial prohibition laws increase the likelihood of dropping out from school by nearly 3% overall, while complete prohibition reduced the likelihood of doing so in the rural sample (by more than 6%). I provide support for the identification strategy used in the analysis by examining the impact on cohorts who were just out of the school-going age at the time these laws were enacted. I find that the alcohol laws have an effect only on individuals who were exposed to these changes during their school-going age, but have no impact on the older cohorts who were between 19 - 24 years of age when the bans were imposed. Finally, I use data from national consumption expenditure surveys to show that these results are driven by shifts in household budgetary allocation. Using a triple difference strategy (exploiting the fact that Muslim households are not affected by alcohol policy changes due to religious rules that proscribe alcohol consumption), I find that households exposed to partial prohibition laws reduce their share of expenditure on education goods by nearly 17 percent relative to the sample mean.

I venture to suggest to you that it is a matter of deep humiliation for the country to find its children educated from drink revenue. We shall deserve the curse of posterity if we so not wisely decide to stop the drink evil, even thought we may have to sacrifice the education of our children.

Mahatma Gandhi
Harijan. 21 September 1947

Introduction

The level of household resources is known to impact demand for education in developing countries (Glewwe and Jacoby, 2004). For instance, adverse income shocks induced by rainfall or crop losses are found to negatively impact educational outcomes (Jensen, 2000; Cameron and Worswick, 2001). Recent studies on the impact of unconditional cash transfers also find some evidence that households increased investments in education and health in response to the cash transfers (Baird et al., 2011; Akresh et al., 2013).

While most studies examine the effect of changes to household income on demand for education, consumer theory suggests that similar wealth effects could also be induced by shifting household consumption. In particular, policies that restrict consumption of addictive goods such as alcohol could potentially result in a substitution of household expenditure towards human capital goods such as health and education. The impact of such substitution is likely to be more pronounced in the context of developing countries – where education usually requires private expenditure and credit markets are missing – especially among poor households. However, there exists little to no empirical evidence on the impact of policies that seek to regulate consumption among parents on the educational outcomes of children.

In this study, I examine the impact of state-level alcohol prohibition laws in India on years of schooling using data from National Family and Health Survey - Round 3 (2005-06). I exploit

the variation in the timing and location of these bans across different states. Individuals who were prenatal, infant, or of preschool or school-going age during the prohibition period in a state are the ones who would experience any effect of the ban. If the direction of this effect is positive, then this exposed cohort is likely to have higher education than older cohorts across all states, and this difference should be larger in treatment states.

There are multiple mechanisms through which alcohol regulation can influence educational outcomes. First, many epidemiological studies provide evidence that alcohol consumption among pregnant women can have detrimental impact on child health and cognitive development in the long run. Prohibition could potentially reduce such direct negative effects, and improve educational outcomes in later life. Second, prohibition could also influence educational outcomes through indirect channels, one of which is the wealth effect – the threat of penalty can lead to a reduction in alcohol expenditure and potential substitution towards educational expenditure. The strength of this mechanism depends on the availability and preference for other substitutes for alcohol goods (such as tobacco products or narcotics, for example) and the degree of enforcement. The degree of enforcement would influence the ease of access to illicit alcohol and its implicit cost. If the ban is too weak, it will result in little or no change in alcohol consumption. Partial enforcement could result in alcohol being illegally available, but at a higher price (reflecting potential penalties if caught and higher cost of access). Consequently, if alcohol consumption is addictive households may incur an overall higher expenditure on alcohol with imperfectly enforced bans. This may result in an unintended negative effect on human capital expenditure - including reduced expenditure on mother and child health during infancy as well reducing affecting spending on education of school going children. The direction of the net wealth effect is therefore theoretically ambiguous and needs to be empirically determined.

To the best of my knowledge, this is the first study to present evidence for the impact of alcohol regulation policies on education. Further, I also use the variation in prohibition rules

across states to examine the heterogeneity in the impact associated with the type of alcohol prohibition policy that was enacted. Specifically, some states imposed a complete prohibition in which sale and consumption of all forms of alcohol were banned; others enforced a ban on only a particular form of cheap alcohol known as *arrack* popularly consumed among poorer households (Rahman, 2002). Multiple sources of information indicate that the partial prohibition could be circumvented, albeit through consumption of costlier, illegally supplied *arrack* or more expensive types of alcohol . For instance news reports from the state of Kerala during its *arrack* ban in 1996 indicate that liquor manufacturers and suppliers were able to bribe enforcement officials to sell illicit arrack in the state[1]. Policymakers in other states as well acknowledged the possibility that arrack bans were difficult to implement and also averred that people who previously consumed arrack were likely to have switched over to costlier liquor after the ban[2] [3]. I estimate the impact of both these forms of bans to explore if the direction and magnitude of impact varies with the nature of the ban.

I find that complete alcohol bans resulted in an increase of 0.28 years of schooling, while partial bans that prohibited only cheaper, locally produced alcohol resulted in a *reduction* of 0.25 years on average among individuals who were exposed to these bans during their school-going age (6 - 18 years of age) or just before that (during preschool, infancy or while *in utero*). This heterogeneity in impact is reflected in the impact on the probability of drop-out from school as well. The results show that partial prohibition laws increased the likelihood of school dropout by nearly 3% in the overall sample. On the other hand, exposure to a complete ban reduces the probability of drop-out in the rural sample, while having no significant impact in the urban areas. When taken together, examining the impact of exposure to any form of alcohol bans (either complete or partial) indicates no significant effect on years of schooling. This overall zero effect is likely driven by the two types of bans having opposite effects.

[1] http://www.rediff.com/news/jul/23keral.htm
[2] http://www.deccanherald.com/content/468298/government-open-reintroducing-sale-arrack.html
[3] http://indiatoday.intoday.in/story/chief-minister-vijaya-bhaskara-reddy-bans-arrack-sale-in-andhra-pradesh/1/303222.html

I also find evidence for heterogeneity in the impact on schooling across urban and rural samples. Complete bans show no effect in the urban areas but have a significant positive effect in rural areas. Partial bans have a significant negative effect on average years of schooling in both samples. Additional analysis also indicates that the effect varies by the age at which an individual is exposed to the ban and also with the length of exposure.

The main assumption underlying my identification strategy is that there are no unobserved time-varying effects that are correlated with the treatment (imposition of prohibition policies) and also influence individual education outcomes. I provide evidence for the validity of this assumption by running a falsification test: I test the effect of the bans on cohorts who were just out of school-age (19 - 24) at the time of the policy change compared to older cohorts (25 - 35). I find no impact on the school years for this cohort which corroborates the assumption that the policy changes were plausibly exogenous and lends validity to my findings.

I also provide support for the hypothesis that these observed effects are driven by shifts in budgetary allocation amongst households. To do so I use household survey data from various rounds of National Sample Survey Organization (NSSO) spanning the period from 1987 to 2011. I exploit the fact that Muslim households are unlikely to be affected by changes in alcohol policies because Islamic religious rules prohibit consumption of alcohol. Empirical results show that non-Muslim households exhibit a significant decline in alcohol participation, whereas this is not the case among Muslim households. I exploit this fact to construct a triple-difference model to estimate the impact of prohibition laws on the share of household expenditure on alcohol and education. The estimates show that partial prohibition laws result in a reduction in the share of expenditure on education of about 17 percent of the sample mean. These results are consistent with the observed effects on educational outcomes using the NFHS data.

The rest of the paper is organized as follows. The next section provides a review of literature related to alcohol consumption impact on human capital outcomes and a background on alcohol regulation policies in India. Section three describes the identification and estimation

strategy used in the analysis on the impact on educational outcomes. Following this, I present and discuss the results from the estimated regression models and the robustness checks. I then examine the impact on household budget shares, and present results from the triple-difference estimates. Finally, I provide some concluding remarks.

Background

Alcohol-related morbidity and mortality has been on the rise in recent years. A recent Global Status Report on Alcohol and Health by the World Health Organization (WHO) reports that in 2012 5.9 percent of all deaths and 5.1 percent of the global burden of disease and injury were attributable to alcohol consumption (WHO, 2014). WHO also reports that "It is the third largest contributing factor to injury and disease worldwide, almost equal to tobacco, and in developing countries with overall low mortality, it is now the leading factor" (WHO, 2011, pg. 2). These factors have motivated much interest in alcohol regulation policy among policymakers. There have also been a number of studies examining the impact of alcohol regulation policies such as minimum age restrictions and alcohol taxes on consumption as well as some other outcomes such as driving fatalities (Chaloupka et al., 2002; Smith and Foxcroft, 2009). Medical literature also provides evidence of the adverse health effects of fetal exposure to maternal alcohol consumption. However, there is limited evidence on the possible effects of alcohol regulation on parental investments in the human capital of their children.

The reduction in alcohol consumption could translate to positive *in utero* and early life shocks by reducing direct exposure to alcohol as well as indirectly, through income and substitution effects. Epidemiological studies provide strong evidence of the negative effects of direct fetal exposure to alcohol. Alcohol consumption by pregnant mothers is associated with a range of fetal alcohol spectrum disorders detrimental to birth outcomes and child development[4]. Studies

[4]http://www.cdc.gov/ncbddd/fasd/alcohol-use.html

also point to the adverse effects of neonatal and postnatal alcohol consumption by mothers on child development (Little et al., 2002; 1989). In the Indian context, this channel is likely to be less pronounced due to the relatively lower prevalence of alcohol consumption among women in India – some studies estimate the prevalence of alcohol use among women to be around 5 % (Benegal et al., 2005).

The second mechanism, which is likely to be stronger in the Indian context, is through foregone household income and substitution between spending on alcohol and expenditures on health and education. Higher spending on alcohol consumption could lead to non-use or delayed maternal and child healthcare, school dropouts, and other negative consequences. For instance, Bonu et al. (2004), based on a multivariate analysis of nationally representative household data from India, found that households using tobacco or alcohol were less likely to immunize their children and exhibited reduced ability to provide adequate childcare, resulting in adverse health outcomes for children

Earlier research finds that the share of alcohol in an alcohol-consuming households budget is about 5.1 percent on average in the period 1983- 2000 (Rahman, 2002). The share of education in the household budget varied between 2 to 7 percent over the same period (NSSO, various). Alcohol bans could potentially shift household expenditure out of alcohol and lead to an increase in the budgetary allocation towards education.

Alcohol regulation in India

Alcohol consumption has been rapidly increasing since the 1980s in India, with an estimated increase in the per capita consumption of 106.7 % between 1970 - 72 and 1994 - 96 (Das et al., 2006). Taxes and excise duties on alcohol sales are an important, and an increasing source of revenue for the state governments in India and can comprise up to 15-20 % of their total revenue (Benegal, 2005). After independence, motivated by the anti-alcohol tenets of Gandhian thought, the Constitution of India directed that "The State shall endeavor to bring about prohibition of

the consumption of intoxicating drink."(Das et al., 2006). Alcohol regulation comes under the legislative purview of state-level governments in India, and each state can independently decide upon the control and organization of the alcohol supply and demand.

Alcohol laws prohibiting consumption of liquor to various degrees have often been the policy instrument used by state governments in India. In the initial, post-independent years many state governments embraced the constitutional directive to prohibit alcohol production and consumption. However, by the 1960s most states, with the exception of the state of Gujarat, revoked these bans[5].

Starting in the late 1980s and early 1990s there were renewed demands for clamping down on alcohol consumption. States varied in their motivation for alcohol regulation. In some cases deaths due to consumption of illicit alcohol (often referred to as *hooch tragedies*[6]) spurred policy makers to enforce bans on *arrack*[7]. In other instances, public advocacy from women's groups (in Andhra Pradesh and Haryana for instance) and religious organizations (particularly church groups in the north-eastern states) motivated political parties to enact complete prohibition as a part of their electoral promises (Patel, 1998).

The state prohibition acts also vary from partial ban on certain categories of alcohol to complete prohibition under which all forms of alcohol are banned. For instance, in certain states, the alcohol ban was limited to *arrack* which is largely consumed in rural areas. Table 1 provides a timeline of both types of bans. The states that imposed these bans are also spread geographically across the country (see Figure 1).

Complete prohibition laws made production, transportation, sale and consumption of liquor illegal. Substantial penalties were imposed including heavy fines and imprisonment for up to

[5]Gujarat has a prohibition policy in place since the inception of the state in 1960. In the analysis here I do not include Gujarat as a treatment state since it has experienced no policy change during the period analyzed.

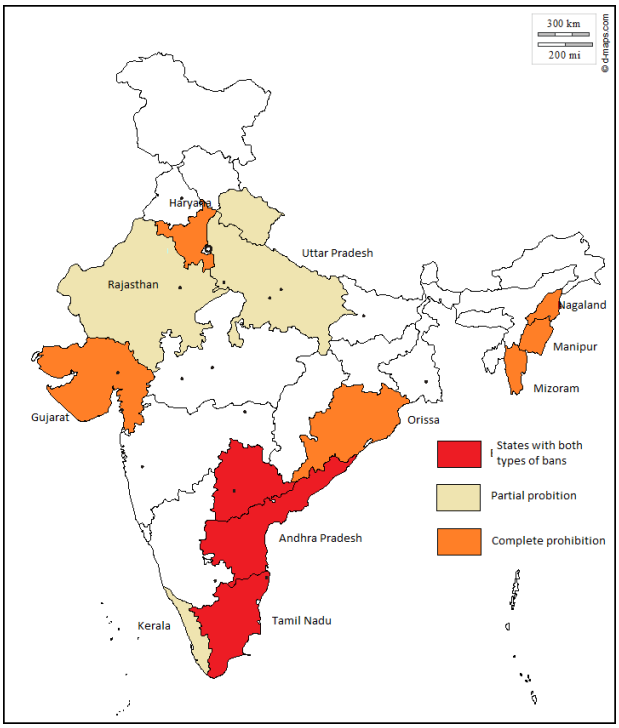
[6]http://www.hindustantimes.com/india-news/timeline-major-hooch-tragedies-in-india/article1-782819.aspx; http://www.atimes.com/atimes/South_Asia/JE29Df01.html

[7]*Arrack* is a form of alcohol distilled locally, and often sold through unlicensed outlets, particularly in rural areas

Table 1: Timeline of alcohol prohibition laws in India from 1974 to 1997 (Rahman, 2002; Mahal, 2000)

State	Start of ban	End of ban
Complete Prohibition		
Nagaland	1989	Present
Manipur	1991	Present
Andhra Pradesh	1995	1997
Haryana	1996	1998
Mizoram	1997	2014
Tamil Nadu	1974	1981
Orissa	1994	1995
Gujarat	1960	Present
Partial prohibition		
Tamil Nadu	1987	Present
Andhra Pradesh	1993	Present
Kerala	1996	present
Rajasthan	1986	1989
Uttar Pradesh	1993	1998

Figure 1: Location of states enacting alcohol prohibition laws in India (1974-1997)



three years [8]. News sources report numerous incidents in which offenders were arrested and penalized. However, there are also many anecdotal reports that indicate that the enforcement of these bans was far from stringent. For instance, the executive director of a prominent distiller was reported saying: "Liquor from five states bordering Andhra Pradesh – Maharashtra, Karnataka, Madhya Pradesh, Orissa and Tamil Nadu – continues to flow into it" while complete prohibition was in place (Outlook, 1996).

As Table 1 shows most of the states that imposed complete bans rolled back the policies after a few years. Alcohol prohibition usually resulted in a significant negative impact on state's revenues. This revenue decline along with the rising cost of enforcement forced states to repeal these acts (Mahal, 2000). In comparison, partial bans that target arrack consumption have had greater longevity, even though enforcement has been an issue with these as well. While alcohol prohibition remains an important policy debate in India, there has been very limited work on examining the economic effects and social impacts of such policies. The lack of systematic data on production, sale, and consumption of alcohol at a disaggregated level in the Indian context has limited the scope of analysis.

There have been only two studies that explicitly examine the effects of prohibition policies. Both of these use self-reported alcohol expenditure data from the national consumption surveys. Mahal (2000) looked at the relative efficacy of various regulatory measures in reducing alcohol consumption using cross-sectional data from rural India. He finds suggestive evidence that taxation works as a better policy for regulating alcohol consumption. Rahman (2002) examines the impact of alcohol prohibition on the consumption of other addictive substances and finds that prohibition leads to an increase in consumption of some tobacco products. Both of these studies do find that the alcohol prohibition laws, on average, did have a significant negative impact on alcohol consumption. Based on data from consumption expenditure surveys the estimated decline ranges from 22 % (Rahman, 2002) to a decline of 30 % to 67 % in the case

[8] See the following media report from Haryana for instance: http://www.nytimes.com/1996/08/18/world/indian-state-s-alcohol-ban-pleases-women-annoys-men.html.

of Mahal (2000). However, interestingly both studies find that alcohol consumption did not go down to zero even in states that experienced a complete ban, lending further evidence to the anecdotal reports that indicated weak enforcement of the alcohol regulation.

Given this weak enforcement and imperfect compliance, the net effect of the alcohol bans on educational outcomes is *a priori* ambiguous. As described earlier, the effect of alcohol prohibition on a household's resource re-allocation depends upon consumption preferences as well as the effectiveness of the ban. If the ban were perfect, then a household would redistribute the entire share of expenditure previously spent on alcohol on other goods. However under an imperfect ban, the effect of the prohibition policy is to increase the implicit price of alcohol and the resulting effect on consumption of addictive goods is not straightforward to predict (Becker et al., 1991).

Data and Identification Strategy

To estimate the impact on educational outcomes I exploit the fact that the exposure to the alcohol ban is determined jointly by the individual's state of residence and his year of birth. Individuals who were over the age of 18 at the start of the ban are already out of school or close to finishing school and normally would not derive any benefit in the form of additional years of school due to the ban. Children who were younger would be exposed to the ban, and serve as the treatment group. Empirically this intuition translates to the following estimating equation:

$$y_{ist} = c + \alpha_t + \gamma_s + \beta_1 D_s * T_i + \delta_{st} s \times t + \beta_2 X_{ist} + \varepsilon_{ist} \tag{1}$$

where y_{ist} is years of education for individual i, born in year t in state s, and c is a constant. α_t are year of birth dummies; γ_s is state dummies; $s \times t$ are state-specific time trends. These

control for age, unobserved time-invariant and linearly trending state-level factors respectively. D_s is an indicator for states with alcohol bans and T_i is a dummy that takes value 1 if individual i was *in utero*, an infant, a preschooler, or of school-going age (atmost 18 years of age) for the period of the ban. For instance, in the case of the state of Andhra Pradesh which had a complete ban from 1995-1997 this interaction would take the value 1 for those individuals who were between ages 0-16 by 1995 (i.e. those born between 1981 to 1995). Those who were 0 at the start of 1995 could have been exposed to the ban while still in the womb or when they were very young.

X_{ist} is a set of individual controls. The first of these is an indicator for the gender of the individual. Female children in India are known to receive less schooling on average compared to male children. Social groups are also known to play an important role in determining the level of educational attainment among children. Therefore, I control for religion and caste group to which the individual belongs. Also, educational infrastructure is likely to vary across urban and rural areas, and hence, I also control for whether an individual resides in urban or rural area. Finally, the NFHS provides a wealth index variable for a household based on a listing of assets and amenities owned (see IIPS (2007) for details of the construction of this variable). This serves as a proxy for household wealth. I control for wealth index quintile since educational attainment is likely to be a function of the household's wealth.

As explained above, it is unlikely that there was complete compliance with prohibition in the states that had bans. Under this assumption, I identify the intent to treat effect of the policy. The ban is likely to have an effect only on households whose alcohol expenditure was a major share of their total expenditure. Since I do not observe which households fall in this subset, I can only estimate the average effect of the ban on the whole population in the treatment states.

I use data from the National Family and Health Survey (NFHS). NFHS is a nationally representative survey that provides a broad range of demographic, health, gender and nutritional information (IIPS, 2007). I use the household members data set from NFHS-3 for examining the

impact on education. The survey collects information on the level of educational attainment in terms of the highest grade completed. NFHS provides a constructed variable which converts this grade completed to the corresponding number of years of education based on usual grade completion years for India (see IIPS (2007) for details). This serves as the dependent variable in the Equation 1. The survey also collects data on age (in years), gender, location (urban/rural and state of residence) and other control variables.

The NFHS also records the date on which the survey was conducted. Using this information along with data on the individual's age I construct a variable for the year of birth for each observation. I then use this to construct the variable for exposure to the ban if the individual resides in a state that enacted an alcohol prohibition law.

Results

I estimate Equation 1 using data from NFHS-3. I limit the observations to those individuals who are age 18 or above by the survey date. This ensures that all individuals in the sample have reached the usual school completion age, and are fully exposed to the risk of drop-out. If the sample included individuals who were still in the school going age this may bias the result if the risk of drop-out varies across treatment and control states. I also limit observations to those individuals who were born after 1971. I do this for two reasons. First, individuals older than this age are likely to have been exposed to the early waves of alcohol prohibition laws in the 1950s and 1960s. Precise information on the location and timing of these early bans is unavailable since state borders in India underwent much reorganization during this period. Second, reports on years of schooling among older cohorts is more likely to suffer from recall bias. The final sample consists of more than 163,000 observations of individuals who were in the age group 18 - 35 at the time of the NFHS-3 survey.

A potential source of error could arise if individuals have migrated from the state in which

they resided during their school-going age to their current state of residence at the time of the survey. This would imply that they are mistakenly identified as being exposed to an alcohol ban but in reality were not (or vice versa). There are two reasons why this may not pose an issue for the analysis in this paper. First, inter-state migration is estimated to be very small, particularly during the time period in which this analysis takes place. Topalova (2007), using national survey data estimated that less than 4 percent of people living in rural areas reported changing either district of residence within the past ten years during the 1980s in India. Second, such migration is unlikely to be systematically correlated to the imposition of alcohol regulation by state governments.

Impact on years of schooling

For the first set of results, I estimate Equation 1 without differentiating between complete and partial bans. That is, the treatment dummy takes the value 1 if an individual was exposed to either complete or partial alcohol prohibition during his school-going age. These results are presented in Table 2. Column (1) presents the estimation results for the specification that does not include individual controls. In Column (2) I present the results for the specification that includes individual-level control variables. Finally, Column (3) and (4) present corresponding results for the urban and rural sub-samples respectively.

The main variable of interest is the indicator for Any ban $\times$ Ban state $\times$ age 6 - 18. This is the difference-in-difference estimator. It indicates the difference in young cohorts (-1 to 18) relative to older cohorts (> 18) in treatment states in comparison to the same difference in states that did not have a ban. This coefficient has a positive sign in the specification with no controls in Column (1) with a point estimate of 0.0403. It turns negative with the addition of controls for the full sample in Column (2) where the coefficient is -0.0308. The coefficient remains negative also for the urban sample in Column (3). For the case where the sample is restricted to rural areas the coefficient is positive (Column (4)). However, none of these coefficients are found to be statistically significant across the four specifications in Table 2.

Table 2: Impact of alcohol bans (complete or partial) enacted from 1974 to 1997 on completed years of schooling of individuals born between 1971 to 1988 in India; exposure defined as being prenatal, pre-school or of school-going age during any ban

	(1) No Controls	(2) Full Sample	(3) Urban	(4) Rural
Any ban × ban state × age -1 to 18	0.0403	-0.0308	-0.151	0.0724
	(0.126)	(0.110)	(0.0980)	(0.148)
Gender				
= 1 if female		-1.598***	-1.030***	-2.143***
		(0.139)	(0.0711)	(0.205)
Religion (base = Hindu)				
Muslim		-1.659***	-1.716***	-1.463***
		(0.247)	(0.237)	(0.248)
Christian		0.406*	0.621***	0.171
		(0.220)	(0.201)	(0.240)
Others		0.0530	0.551***	-0.267
		(0.190)	(0.0886)	(0.243)
Caste (base = upper caste)				
scheduled caste		-0.880***	-1.017***	-0.723***
		(0.146)	(0.166)	(0.140)
scheduled tribe		-0.965***	-0.747***	-0.937***
		(0.213)	(0.286)	(0.203)
other backward caste		-0.521***	-0.608***	-0.426***
		(0.173)	(0.209)	(0.145)
others		-0.311**	-0.442***	-0.293*
		(0.157)	(0.136)	(0.174)
Wealth quintile (base = poorest)				
poorer		1.538***	1.293***	1.600***
		(0.119)	(0.115)	(0.120)
middle		2.992***	2.694***	3.154***
		(0.161)	(0.230)	(0.159)
richer		4.925***	4.731***	5.166***
		(0.161)	(0.238)	(0.153)
richest		7.483***	7.507***	6.992***
		(0.143)	(0.167)	(0.182)
Observations	163053	163053	78456	84597

Note: All specifications include state and birth year fixed effects. Standard errors clustered by state.

* p < 0.1, ** p < 0.05, *** p < 0.01.

The direction and magnitude of the coefficients on the individual control variables are as expected and in line with available evidence on education patterns in India, lending validity to these results. I find that there is a significant gender differential in years of schooling with females having lower years of schooling relative to males. This differential is about 1.6 years in the overall sample and increases to 2.1 years in the rural sample. Similarly, there is a significant variation in years of schooling with household wealth levels. The richest wealth quintile has nearly seven times than the average years of schooling relative to the poorest quintile. This finding is similar to previous studies that have analyzed educational outcomes in India using the NFHS data. For instance, Filmer (2000) reports a " a 2.5 percentage point difference between male and female enrollment for children from the richest households, the difference is 34 percentage points for children from the poorest households".

There are also wide differences across social groups. Muslims have lower years of schooling relative to Hindus. Scheduled Castes (SC), Scheduled Tribes (ST) and Other Backward Castes (OBCs) who comprise caste groups that were traditionally discriminated against also have lower years of schooling on average relative to upper castes. These results are similar to earlier studies that report on the considerable disparities in educational outcomes between religious and caste groups in India (Borooah and Iyer, 2005).

The results in Table 2 show that the overall impact of all alcohol bans is not statistically different from zero. However, these results do not shed any light on the possible differences in the impact of partial and complete bans. Therefore, to distinguish between exposure to these two bans I define separate treatment dummies for each ban type. I use the same set of individual controls as in Columns (2) - (4) in Table 2, but re-estimate Equation 1 using an expanded set of treatment indicators, *viz.*, an indicator for individuals who were exposed to a complete prohibition policy, an indicator for those exposed to partial alcohol bans, and an indicator for individuals who experienced both sets of bans during their school-going years [9].

[9]Tamil Nadu and Andhra Pradesh have had both types of bans during different years. See Table 1.

Table 3: Impact of alcohol bans enacted from 1974 to 1997 on completed years of schooling of individuals born between 1971 to 1988 in India (impact disaggregated by complete, partial or exposure to both types of bans); exposure defined as being prenatal, pre-school or of school-going age during ban

	(1) Full Sample	(2) Urban	(3) Rural
Complete ban	0.276*	-0.0289	0.491**
	(0.163)	(0.204)	(0.201)
Partial ban	-0.229***	-0.212**	-0.235***
	(0.0585)	(0.101)	(0.0695)
Exposure to both bans	-0.492**	-0.137	-0.908***
	(0.215)	(0.296)	(0.205)
Observations	163053	78456	84597
Mean of dependent variable	6.968	8.295	5.738

Note: All specifications include state and birth year fixed effects. Standard errors clustered by state.

* p < 0.1, ** p < 0.05, *** p < 0.01.

Table 3 presents the results of this estimation. For brevity, I present only the coefficients on the variables of interest and suppress the coefficients on the other variables.

The estimation results for the full sample of observations in Column (1) indicate that a complete alcohol ban resulted in an increase of 0.28 years of schooling on average. This a 4 percent increase over the mean years of schooling for this sample which are 6.97. However, a partial ban has a comparable impact in terms of magnitude but opposite in direction. Exposure to a partial bans results in a lowering of years of schooling by 0.23 on average. Exposure to both sets of bans has a larger negative effect. These results imply that the opposing effects of the two types of bans drive the net zero effect seen earlier.

Columns (2) and (3) of Table 3 examine the impact disaggregated by urban and rural samples respectively. The effect of a complete ban is not statistically significant in the urban areas but remains strongly positive in the rural sample. A complete ban results in an increase of nearly half a year of schooling, which is about 8.6 percent of the average years of schooling in

the rural sample. These positive effects are countervailed by the negative impact of the partial bans. This negative effect remains consistent across both samples, translating to an effect size of about -2.5 percent and nearly -4 percent of the mean level in urban and rural areas respectively. Interestingly, exposure to both bans over the course of an individual's school-going age has an even strong negative impact in the rural areas.

Impact on school drop-out

The next set of results examine the impact of alcohol regulation on likelihood of dropping out from school. These results provide suggestive evidence for the mechanism that underlies the impact on years of schooling. The estimating equation is similar to Equation 1. The dependent variable is defined as taking the value 1 if an individual dropped out from school. School drop-out is defined as having less than 12 years of school, given that individual is more than 18 years of age and has enrolled in school at some time. Using this binary variable as the dependent variable, I estimate a linear probability model for the likelihood of drop-out.

The results of this estimation are shown in Table 4. Given that the dependent variable takes the value 1 if an individual dropped out from school, a positive coefficient indicates an increased probability for drop-out. In the full sample, Column (1), the results show that partial bans increase the likelihood of drop-out by 2 percentage points, while complete bans have no effect. However, in the rural sample, the complete bans have a significant effect on reducing probability of drop-out by 5.1 percentage points.

Overall the direction of the effects on probability of drop-out follow a pattern analogous to the results seen in the case of years of schooling. This suggests that the alcohol bans have an impact on educational outcomes by operating through their effect on drop-out. This is potentially driven by income and substitution effects alongside other mechanisms as well.

Robustness checks

The underlying assumption for the identification strategy is that the imposition of the ban is

Table 4: Impact of alcohol bans (complete or partial) enacted from 1974 to 1997 on probability of dropping out from school before completing 12 years of education, of individuals born between 1971 to 1988 in India; exposure defined as being prenatal, pre-school or of school-going age during any ban

Dependent variable =1 if dropped out from school before 12 years of schooling	(1) Full Sample	(2) Urban	(3) Rural
Exposure to complete ban	-0.0421	-0.0424	-0.0511**
	(0.0303)	(0.0438)	(0.0237)
Exposure to partial ban	0.0201*	0.0277**	0.00908
	(0.0108)	(0.0120)	(0.0167)
Exposure to both types of bans	0.0885***	0.0896*	0.110***
	(0.0337)	(0.0473)	(0.0268)
Observations	127047	68102	58945
Mean of dependent variable	0.693	0.601	0.800

Note: All specifications include state and birth year fixed effects. Standard errors clustered by state.

* p < 0.1, ** p < 0.05, *** p < 0.01.

exogenous i.e., $D_s * T_i$ is uncorrelated with ε_{ist} in Equation 1. The fact that the sample includes older cohorts whose years of schooling cannot have been affected by the policy change allows me to test this assumption. To do so I estimate a regression model of the following form.

$$y_{ist} = c + \alpha_t + \gamma_s + \sum_{j=1}^{q} \beta_j D_s * T_j + \delta_{st} s \times t + \beta_2 X_{ist} + \varepsilon_{ist} \quad (2)$$

where T_j is an indicator for age-group j, and other variables are defined the same way as in equation 1. I define three different age-groups – primary school age(6-14) , secondary school age (15 - 18), and out of school (19 - 24). The left out group is the cohort in the age interval 25 - 35. The ranges for the primary and secondary school age groups are based on the standard primary and secondary school definitions in the Indian educational system. If the coefficient on the 19 - 24 age group is not significantly different from zero, this would lend support for the identification strategy used in the study.

As a test of the identifying assumption, I estimate Equation 2 using years of schooling as the outcome variable. The results are presented in Table 5. The key result here is that the policy has no effect on cohorts age 19-24 in comparison to the control cohorts (age group 25 - 35) across all three samples (complete, urban and rural) as well as for both types of bans which helps corroborate the identification assumption used in the analysis. Table 5 also indicates that across the three samples the effect on years of schooling is driven by the impact on exposure during infancy, preschool and primary school age (years -1 to 14), particularly for partial bans (see Table 5).

Table 5: Impact of alcohol bans enacted from 1974 to 1997 on completed years of schooling of individuals born between 1971 to 1988; impact disaggregated by exposure during prenatal or pre-school, primary school or high school

	Full Sample	Urban	Rural
Exposure to complete ban during			
-1 (prenatal) to 14 years of age	-0.130	-0.163**	-0.104
	(0.183)	(0.0793)	(0.689)
15 to 18 years of age	-0.200	-0.187*	-0.237
	(0.129)	(0.107)	(0.307)
19 to 24 years of age	-0.274	-0.293	-0.261
	(0.299)	(0.271)	(0.338)
Exposure to partial ban during			
-1 (prenatal) to 14 years of age	-0.601	-0.647**	-0.598**
	(0.604)	(0.315)	(0.263)
during 15 to 18 years of age	-0.368	-0.157	-0.403*
	(0.476)	(0.335)	(0.234)
19 to 25 years of age	-0.117	0.0647	-0.0992
	(0.580)	(0.111)	(0.236)
Observations	163053	78456	84597
Mean of dependent variable	6.968	8.295	5.738

All specifications include state, birth year fixed effects and state-specific time trends
Standard errors clustered by state, corrected for small number of clusters
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Potential mechanism: impact on household expenditure on education

In this section, I test the hypothesis that the above results driven by shifts in household expenditure allocation. Specifically, I test whether households that reside in the states during the periods when alcohol prohibition policies were enacted exhibit a change in the share of their expenditure on educational goods. To do so, I use detailed household consumption expenditures data from the quinquennial surveys conducted by the National Sample Survey Organization (NSSO). These NSSO surveys collect data on various items of household consumption, including alcohol and educational goods such as books, stationery, tuition fees and other related items (NSSO, various).

The NSSO data that I use spans the period 1987 to 2011 and various survey rounds provide repeated cross-sections at roughly 5 year intervals [10]. The use of a standard difference-in-difference estimator can be problematic, given the time period that these data cover. The surveys do not provide sufficient pre-treatment data points for many of the states that experienced alcohol prohibition policies. However, a more robust, triple-difference estimation strategy is possible, using the fact that Muslim households are unlikely to be affected by changes in alcohol policy.

Religious rules in Islam prohibit alcohol consumption (Michalak and Trocki, 2006). The result of this is also empirically visible in the prevalence of alcohol consumption across religious groups (Table 6). The share of Muslim households that report consumption of alcohol is much lower than other religious groups in the NSSO data. Importantly, there is no signficant difference in the reported alcohol use in Muslim households across alcohol policy regimes. On the other hand, significant differences are observed across all other religious groups (Table 6).

[10] The NSSO rounds that I use are the following: Round 43 (1987), Round 50 (1993), Round 55 (1999), Round 61 (2004), Round 66 (2009) and Round 68 (2011)

Table 6: Prevalence of alcohol consumption across religious groups - with and without alcohol bans

	= 1 if HH consumes alcohol		
	No ban	*Ban*	*Difference*
religion			
Hinduism	0.151	0.129	0.021***
Islam	0.033	0.036	-0.003
Christianity	0.256	0.125	0.131***
Sikhism	0.205	0.086	0.119**
Others	0.487	0.184	0.302***
Total	0.147	0.119	0.028***

Note: Dependent variable takes the value 1 if household reports any consumption of alcohol. Data is based on NSSO surveys.

* p < 0.1, ** p < 0.05, *** p < 0.01.

I exploit this fact in order to employ a triple-difference identification strategy. Specifically, I estimate regressions of the following form:

$$y_{ist} = \beta_0 + \beta_1 D_s + \beta_2 M_i + \beta_3 (D_s \times M_i) + \delta_0 T_t + \delta_1 B_{st} + \delta_2 (T_t \times M_i) + \delta_3 B_{st} \times M_i \quad (3)$$

where D_s is a set of state dummies, M is an indicator taking the value 1 if household i is non-Muslim, T_t is a set of survey year dummies, and B_{st} is an indicator taking the value 1 if state s has an alcohol ban in place during year t. The coefficient of interest is δ_3 which measures the relative change in outcome for non-Muslim households in treatment states, netting out the changes in non-Muslim households in control states and the change in Muslim households in the treatment states.

I use this strategy to first estimate the impact of prohibition policies on households' share of expenditure on alcohol.The results are presented in Table 7. I estimate Equation 3 for the whole sample without the inclusion of other household characteristics as covariates in column (1). I

then estimate the same with the inclusion of additional controls in Column (2), followed by estimates for rural and urban areas separately in columns (3) and (4). While they are not statistically significant at the 10 percent level, nevertheless the sign on the δ_3 coefficients (positive for Partial ban = 1 $\times$ Non-Muslims = 1 and negative for Complete ban = 1 $\times$ Non-Muslims = 1) are consistent with what we would expect given the relative strength of enforcement for each type of ban. The results suggest a negative impact on alcohol expenditure share due to the complete ban, particularly in the urban areas, while the partial bans have positive to no effect on alcohol expenditure shares.

Next, I examine the impact on share of households' expenditure on education related items (Table 8). There is a significant negative impact of the partial alcohol prohibition policies on education expenditures for the full sample in Column (1), when no additional household characteristics are included. The effect size reduces and is no longer statistically significant when household control variables are included in Column (2). However, the negative effect remains significant in the sample of rural households in Column (4). The negative effect is about 17 percent of the mean share of household expenditure on education in the rural sample.

These results are consistent with what I find on the impact on educational outcomes. Similar to the results there (Tables 3 and 4), the impact on educational expenditures is most pronounced amongst rural households who were exposed to partial alcohol prohibition laws. Put together these results suggest that the expenditure substitution mechanism drives the impact of alcohol prohibition policies on education outcomes.

Conclusion

To the best of my knowledge, this paper presents one of the first sets of results examining the impact of alcohol regulation policies on educational outcomes. This study contributes to the literature on regulation of addictive consumption as well as to the works examining unintended

Table 7: Impact of prohibition policies on alcohol expenditure share - triple-difference estimation results

	(1) Full sample	(2) Full sample	(3) Urban	(4) Rural
Partial ban=1	-0.000863*	-0.000841*	-0.00126**	-0.000428
	(0.000468)	(0.000463)	(0.000588)	(0.000711)
Non-Muslim=1	0.00714***	0.00613***	0.00679***	0.00518***
	(0.000445)	(0.000448)	(0.000665)	(0.000603)
Partial ban=1 × Non-Muslim=1	0.000502	0.000546	-0.000226	0.000883
	(0.000500)	(0.000494)	(0.000642)	(0.000748)
Complete ban=1	-0.00196	-0.00232	-0.00256	-0.00131
	(0.00197)	(0.00195)	(0.00257)	(0.00293)
Complete ban=1 × Non-Muslim=1	-0.00169	-0.00156	-0.00357	-0.000748
	(0.00201)	(0.00199)	(0.00262)	(0.00299)
HH controls	No	Yes	Yes	Yes
Mean of dependent variable	0.008	0.008	0.006	0.009
Observations	690840.0	689807.0	269327.0	420480.0

Note: All specifications include state and year fixed effects, and interaction of state and year dummies with indicator for non-Muslim household. Standard errors clustered by state. Complete ban is dummy equal to 1 for observations from states with complete alcohol prohibition during years when ban is implemented. Similarly 'Partial ban' is a dummy for partial alcohol. Household controls include age, sex, education level and marital status of household head, number of male and female children under 18, household size, monthly per capita consumption quintile, scheduled caste or tribe and indicator for rural/urban in the full sample.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Impact of prohibition policies on education expenditure share - triple-difference estimation results

	(1) Full sample	(2) Full sample	(3) Urban	(4) Rural
Partial ban=1	0.00303***	0.00178**	0.00144	0.00289***
	(0.000879)	(0.000842)	(0.00137)	(0.00106)
Non-Muslim=1	0.0119***	0.0124***	0.0121***	0.0120***
	(0.000836)	(0.000816)	(0.00155)	(0.000897)
Partial ban=1 × Non-Muslim=1	-0.00305***	-0.00126	0.000324	-0.00298***
	(0.000939)	(0.000899)	(0.00149)	(0.00111)
Complete ban=1	0.000100	-0.000293	0.000524	-0.00472
	(0.00370)	(0.00354)	(0.00598)	(0.00436)
Complete ban=1 × Non-Muslim=1	-0.00180	-0.00114	0.00166	-0.000285
	(0.00377)	(0.00362)	(0.00611)	(0.00445)
HH controls	No	Yes	Yes	Yes
Mean of dependent variable	0.024	0.024	0.034	0.018
Observations	690840.0	689807.0	269327.0	420480.0

Note: All specifications include state and year fixed effects, and interaction of state and year dummies with indicator for non-Muslim household Complete ban is dummy equal to 1 for observations from states with complete alcohol prohibition during years when ban is implemented. Similarly 'Partial ban' is a dummy for partial alcohol. Household controls include age, sex, education level and marital status of household head, number of male and female children under 18, household size, monthly per capita consumption quintile, scheduled caste or tribe and indicator for rural/urban in the full sample.

* p < 0.1, ** p < 0.05, *** p < 0.01.

consequences of policy changes.

The evidence presented here provides a mixed picture of the impact of alcohol regulation policies on educational outcomes in India. Exposure to complete alcohol bans appears to have a positive impact on years of schooling, particularly in the rural areas. However, this positive effect is largely counterbalanced by the negative impact of partial alcohol bans. This negative effect appears to be driven by shifts in household expenditure allocations. Specifically, we find that partial bans result in a reduction in the share of a household's expenditure on education.

Even in the case of complete bans, these have usually lasted only for a few years in most states. Most commentators report that these bans have proven to be costly to enforce and result in loss of excise and tax revenue for the state. On the other hand, partial bans that have been in place for longer duration result in negative effects on education. Computing the true economic cost of such policies requires estimating the returns to these additional years in school and the economic costs and benefits due to other potential impacts of prohibition. The results in this paper suggest that these policies are likely to have significant societal effects and unintended consequences and merit further investigation.

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