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ABSTRACT

Women, Violence and Work: Threat of Sexual Violence and Women's Decision to Work*

The stagnancy of women's workforce participation in urban India is alarming and puzzling, considering the pace of economic development experienced in the previous decade. We investigate the extent to which the low workforce participation of women can be explained by growing instances of officially reported crimes against women. We employ a fixed effects strategy using district-level panel data between 2004-2012. To address additional concerns of endogeneity, we exploit state-level regulations in alcohol sale and consumption and provide estimates from two different strategies – an instrumental variable approach and a border-analysis. Our findings indicate that a one standard deviation increase in sexual crimes per 1000 women reduces the probability that a woman is employed outside her home by 9.4%. While we find some evidence of heterogeneity across regions and religions, overall, the deterrent effect seems to affect women equally across all economic, demographic and social groups.

JEL Classification: E24, J08, J16, J18

Keywords: crime-against-women, female labor supply, instrumental variable, alcohol regulation

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1 Introduction

India is an outlier when it comes to women's labor force participation. Over the past decades, the country experienced high growth rates, significant improvement in women's educational attainment, and a remarkable decline in fertility rate. Nevertheless, the female labor force participation rate (FLFPR) has remained quite low when compared to other emerging economies. The International Labor Organization (2019) places India at 179th among 185 countries for women's labor force participation.

Policymakers around the world have considered a broad range of policies to increase women's labor force participation rates. These include policies related to maternity benefits (Baker and Milligan, 2008), child care support (Cascio et al., 2015), tax incentives(Eissa and Liebman, 1996) and protection against discrimination at work (Neumark, 1993). While variants of most of these policies are followed globally, their relevance varies widely across countries. For instance, the need for greater child care support is likely to depend on the social context. Child care support might be a less responsive policy in societies where help from extended families is widely prevalent. On the other hand, there could be factors which are equally or more relevant to encourage women's workforce participation. In this paper, we investigate the role played by the threat of sexual violence on women's labor force participation, especially for work that involves traveling away from home. Based on our findings, we explore a new line of policy to improve female labor supply in countries with a high incidence of crime against women - reducing the implicit cost of traveling to work.

Sexual violence against women is widely documented to be a significant deterrent to women's liberty to move freely, both in developed and developing nations. Past studies have provided survey-based evidence on how women modify their lifestyle choices to reduce the risk of violence. For example, Riger and Gordon (1981), in a study of a few cities in the US, find that women are much more likely to avoid going out at night than men. The gravity of sexual violence against women has been increasingly recognized at the international level, and United Nations now declares it as a major violation of women's rights. However, the incidence of such violence and the stigma borne by the victims of sexual violence vary widely. In India, several surveys report that women commonly experience sexual violence in public spaces. In a survey of adolescent girls in Delhi, 92% reported having experienced some form of sexual violence in public spaces in their lifetime (UN-Women and ICRW, 2013). Another survey, conducted in relatively smaller cities, found that 95% of women feel unsafe using public transport, and a similarly high fraction of women reported feeling unsafe while waiting for public transport, in the marketplace, or on the roads (Kapoor, 2019). Other surveys report the perceived threat of sexual violence to be one of the foremost reasons discouraging women from working. In their survey of non-working women in Delhi, Sudarshan and Bhattacharya (2009) find that safety concern is cited as the second most important reason for not working. The fear became particularly prominent after the Nirbhaya Delhi rape case of 2012, widely reported in domestic and international media. Nearly 82% of the 2,500 women surveyed in several Indian cities after the attack reported leaving the office earlier (Thoppil, 2013). These surveys suggest that the prevalence of sexual crimes may discourage women who are

considering whether to work or not.

Extensive research exists on women's choice to participate in the labor force. However, very few have tried to link the threat of sexual violence to women's economic choices, particularly labor supply decisions. To our knowledge, Mukherjee et al. (2001), Chakraborty et al. (2018) and Siddique (2021) are the only papers to study the relationship between sexual violence and women's labor force participation.[1] However, both Mukherjee et al. (2001) and Chakraborty et al. (2018) only establish correlations. While the former finds a positive correlation in a Delhi-based survey, the latter uses cross-sectional data from the India Human Development survey to find a negative relationship. The discrepancy in findings could be driven by the non-causal approaches. Siddique (2021) is the closest to our work. She uses data from two rounds of the National Sample Survey between 2009 and 2012 and links it with political events data from the Global Database of Events, Language and Tone(GDELT) to study the effect of any physical or sexual violence against women on women's labor force participation in India. After eliminating district-specific factors and accounting for state-time effects, she finds a significant reduction in women's participation in areas with higher reported incidents of violence.

We analyze the impact of sexual crimes against women on women's labor force participation. We specifically focus on sexual violence since there is no apriori reason to believe that other forms of physical violence, like murder, would affect men and women's choices differently. Our analysis rests on a fixed-effects model using district-level panel data from India stretching over a period of almost 10 years. We obtain employment information from four waves of the National Sample Survey conducted between 2004-05 and 2011-12. We combine this with official police records on district-level incidences of reported sexual crimes such as rape, molestation, and sexual harassment as opposed to media reports or self-reported perception measures. On the other hand, the GDELT data used by Siddique (2021) aggregates information on violence related to political events from a few prominent English dailies. Given the vast linguistic diversity of India and the relatively limited reach of English print media across the wider population, police cases registered across India, which comprises both political and apolitical crimes, are more likely to be representative of crimes from all corners of India.

However, as is true of all measures of reported crimes, print or perceived, registered crime data is also likely to suffer from measurement error problems due to large scale under-reporting (Iyer et al., 2012). Hence, we conduct additional analysis exploiting potential exogenous variation in crimes against women coming from variation in alcohol regulation policies across India. First, we provide estimates from an instrumental variables approach that exploits state-level variation in the minimum legal alcohol drinking age. We argue that restriction on alcohol sale and consumption is unlikely to affect women's labor supply directly but closely relate to crimes against women (Luca et al., 2015). Second, we use a complete alcohol ban in the state of Gujarat to conduct a border-analysis. This approach compares the interior districts of Gujarat with those sharing a common border with the neighboring states where

[1] Borker (2017) studies how the threat of sexual violence affects the educational choices of women in Delhi. She finds that girls settle for lower-quality colleges in order to avoid sexual harassment while traveling to college.

there is no prohibition on alcohol sales.

We find a robust and statistically significant deterrent effect of sexual crimes on female workforce participation. A one standard deviation increase in sexual crimes per 1000 women (as per police reports) reduces the probability that a woman is employed outside her home by 9.4%. In comparison, Siddique (2021) finds that a one standard deviation increase in local sexual assaults (as per media reports) per 1000 people reduces the probability that a woman is employed outside her home by 5.5%. This difference could be driven by the possibility that while police records of sexual crimes may underestimate actual crime rates, media reports likely suffer from a greater degree of measurement error.

The productive employment of working-age women has important economic and social implications. According to United Nations Economic and Social Commission for Asia and Pacific (UNESCAP), had India reached the same FLFPR as the US (86%), its GDP would have increased by an additional 4.2% (UNESCAP, 2007). Considering the sizable implications, it is imperative to investigate the reasons behind the low participation rate. Previous researchers have attributed the declining trend in FLFPR in India to various supply-side and demand-side factors. One explanation is that employment for poorly educated women coming from the lower economic spectrum is typically driven by necessities rather than economic opportunities. In the absence of education, opportunities outside the home are limited to socially stigmatized low-skilled work. Hence, a rising household income makes a convincing case for women to quit working – an income effect (Olsen and Mehta, 2006). Himanshu (2011) and World-Bank (2010) find a pattern of growth in female employment during financial distress consistent with the income-effect hypothesis. In fact, a part of female-employment growth in India between 1999 and 2005 can be explained by the setback in the agricultural sector that forced women to enter the labor market to supplement household income (Abraham, 2009). The decline post-2005 is, therefore, interpreted as a reversal of the increase that was initially driven by distress. Higher income also leads to greater involvement of working-age women in education, which explains some crowding out in FLFPR between 2005 and 2010 (Rangarajan et al., 2011). As female education rises and the opportunities for white-collar jobs open up, the income effect weakens and the substitution effect strengthens since there is no social stigma against white-collar jobs (Goldin, 1994; Olsen and Mehta, 2006; Mammen and Paxson, 2008). Hence, within highly educated women, the low FLFPR is partly attributed to the selection into higher education (Klasen and Pieters, 2015) and partly to the lack of suitable employment opportunities (Das and Desai, 2003).[2] Our paper contributes to this literature by estimating the extent to which the incidence of sexual violence against women explains women's low labor supply in India. Encouraging women's labor force participation by addressing longstanding social norms or ensuring adequate supply of jobs are challenging and require more long term policy interventions. Our findings raise a possibility of a more immediate policy intervention that could enable women to join the labor force. Further, policies directed at reducing crimes against women have first order implications aside from improving women's labor force participation.

[2]However, as we discuss in Section 2.2, a cursory look at the data does not provide any evidence that selection into higher education is reducing women's labor force participation during our sample period.

The rest of the paper is organized as follows: Section 2 describes the data sources and descriptive statistics, along with the spatial and chronological trends. Section 3 explains the estimation approach and summarizes the main findings. Section 4 concludes.

2 Data

2.1 Data Sources

We compile data from various sources for our analysis. First, we collect individual-level data on labor force participation and demographic particulars from four National Sample Surveys (NSS) on employment and unemployment conducted between 2004-2011: survey-years 2004 (round 61), 2007 (round 64), 2009 (round 66), and 2011 (round 68) [3]. Each round surveys more than 100,000 households across India and is representative at the national and state levels. Next, we obtain data on reported rapes, molestation, and sexual harassment (Sections 376, 354, and 509 of the Indian penal code, respectively) from the 'Crimes in India' publications by the National Crime Record Bureau (NCRB). We match the NSS data with the previous year's reported sexual crimes aggregated at the district and state level. We ignore the crimes registered with railway police and special crime branches because their jurisdictions span over multiple administrative districts. These divisions record less than 0.6% of the total sexual crimes in India. Between 2004-2011, several new administrative districts were created by splitting existing districts or combining fragments from two or more districts, so the district boundaries have changed over time. To maintain consistency in geographical regions over time, we club new districts with their old parent districts, thus obtaining 566 units after aggregation.

In addition to the employment and crime records, we obtain district-level female population data from 2001 and 2011 decennial censuses to estimate district-level female population for survey years 2004 and 2007-2011, respectively. We use this data to calculate district-level female-per-capita sexual crimes, which is our primary regressor in the analysis. Finally, for our instrumental variable analysis, we collect state-specific alcohol regulations for 25 (out of 28) states and 6 (out of 7) union territories from the laws published by state excise departments (Table A2).

[3] Survey years refer to the year in which the survey started. E.g., a survey conducted in 2004-05 is denoted by the year 2004.

2.2 Estimation Sample and Summary Statistics

We focus on the NSS urban sample of women aged 21-64 years. Although the working-age population is defined as 15-64[4], we consider women above age 21 since they are likely to have completed college by then. Our outcome variable of interest is workforce participation, which we construct using individuals' self-reported principal activity statuses during the 365 days preceding the survey date. Figure 1 summarizes the broad activity categories. Around 70% of women across all survey years are homemakers, i.e., engage only in domestic duties. The 'employed/ seeking work' category (12.0-15.9%) includes regular/casual wage employees working away from home and women who are not engaged in work but are available for work or making tangible efforts to seek work. The 'self-employed' category comprises women engaged as paid or non-paid workers in the household enterprises and constitutes less than 10% of the sample in any given year. The 'others' category ($< 6\%$) comprises students, rentiers, pensioners, remittance recipients, physically disabled, etc. Our outcome variable takes value one for women who work as regular/casual wage employees away from home or are seeking (available for) work, and zero for homemakers. We exclude self-employed women since they work in household enterprises and are less likely to be exposed to crimes that occur while traveling to work or at the workplace. We also exclude the 'others' category from our analysis. The final sample includes 177,316 women from 140,048 unique households. Our variable of primary interest is a woman's vulnerability to sexual crimes, which include reported rape, molestation, and sexual harassment.

Figure 2 plots the national trends in sexual crimes and women's LFP in our sample. Panel (a) shows that the rape cases reported in the country steadily increased by 48%, the molestation reports went up by 27%, and the overall complaints related to sexual-offenses rose by 25%. Panel (b) shows that women's workforce participation declined over this period, from about 19% to 16% as reported in Table 1 Panel(b). The stagnancy in women's LFP is in sharp contrast to the steady improvement in educational attainment levels. The percentage of urban women with a graduate degree increased from 14% to 19%, and the percentage of illiterate women fell from 31% to 19%. One might argue that the reduction in workforce participation could merely be an artifact of the redirection of working-age women to higher education. Figure 3 shows that this was not the case, as women's LFP was stagnant across all age groups. If anything, the labor-force participation slightly increased in the education-seeking age group (20-30 years). Overall, these trends point towards worsening, or stagnation at best, of both sexual crimes and women's LFP between 2004-2011.

In Figure 4, we explore the cross-section variation in sexual crimes and women's LFP across the states of India. Panel (a) reports the state-wise incidence of sexual crimes during the calendar year 2010. Panel (b) reports the urban female workforce participation in NSS year 2011-12. A quick look reveals that states with high reported instances of crimes against women (darker shades) tend to have low female workforce participation (lighter shades). Similarly, states with low reported instances of crimes against women tend to have high

[4]OECD (2021), Working age population (indicator). doi: 10.1787/d339918b-en (Accessed on 25 March 2021)

female workforce participation. However, neither cross-sectional nor time-series correlations establish causality since there may be unobserved confounding differences across geographical regions and over time. In the empirical analysis, we, therefore, rely on fixed-effect models.

Table 1 reports the means (and standard deviations) of all the variables used in the analysis for our estimation sample.[5] We present the summary across all four sample years to examine the historical trends. Panel (a) shows that districts, on average, had around 14 sexual crimes, 42 thefts, and 7 murders per hundred thousand women. Note that while the total reports of sexual crimes increased considerably (Figure 2), the per-capita values are stable over the years since they account for the growth in the female population over this period. The district-level female-to-male child sex ratio in the 0–6 age group has improved over the years, and roughly 1% of girls got married before the age of eighteen. Male unemployment rate and middle-school completion rate were, on average, 2% and 22% respectively. Panel (b) summarizes the personal and household characteristics from the NSS data. The average woman in our sample is 37 years of age, completed middle school, is 75% likely to be a Hindu, 45% likely to be from the general caste category, and belongs to a household with 5 members.

In the remainder of the paper, we empirically explore how much of the variation in female workforce participation can be attributed to sexual crimes.

3 Empirical Model and Results

In this section, we examine the association between the sexual-crime rate and female workforce participation. Under the cost-benefit framework of Chakraborty et al. (2018), a woman's participation can be seen as a rational choice wherein she works if the expected benefit from work exceeds the expected cost of work. Higher instances of crimes against women raise the likelihood of victimization and increase the psychological cost of work. Woman's labor force participation could also be an outcome of the household's decision-making. Hence in our empirical framework below, the extent of sexual violence could be thought of as shaping the perception of the entire household to which the woman belongs and the woman's labor supply as an outcome of household utility maximization.

3.1 Baseline Analysis

We begin by estimating the following baseline linear probability model incorporating lagged sexual-crime reports:

$$W_{idt} = \beta_0 + C_{d,t-1}\beta_1 + \beta_2 X_{idt} + \delta_d + \delta_t + \delta_{dt} + \epsilon_{idt} \tag{1}$$

[5] See Table A3 for a summary of state-level characteristics.

where W_{idt} is an indicator taking value one if individual i from district d participates in the workforce outside home as per survey-year t, and zero if she primarily engages in domestic duties. $C_{d,t-1}$ denotes the sexual-crime rate in district d in the calendar year $t-1$, which we calculate as the sum of reported rape ($R_{d,t-1}$), molestation ($M_{d,t-1}$), and sexual harassment ($H_{d,t-1}$) cases per thousand women in the district.

$$C_{d,t-1} = \frac{R_{d,t-1} + M_{d,t-1} + H_{d,t-1}}{F_{d,t-1}} \times 1000 \tag{2}$$

$F_{d,t-1}$ represents the district-level female population in the year $t-1$ as estimated from the closest decennial census data (census 2001 for survey-year 2004 and census 2011 for survey-years 2007-11). β_1 captures the effect of exposure to sexual crimes on the decision to participate in the workforce and is the parameter of interest. The lag in the sexual-crime rate allows us to address potential reverse causality arising mechanically as workforce participation outside the home renders women vulnerable to crimes. X_{idt} represents individual-level characteristics (age and education status) and household-level characteristics (household size, and religious and caste affiliation) that affect an individual's employability or choice. We capture religion using an indicator that takes value one if the respondent follows Hinduism and zero for all other religious groups. Similarly, we record caste affiliation using indicators for socially disadvantaged SC, ST, and OBC groups that qualify for affirmative action schemes in India, treating General caste as the omitted category. δ_d represents district fixed effects that account for time-invariant unobserved differences across geographic regions that may be correlated with workforce participation as well as the incidence of crimes against women. Large districts with a high population, for instance, experience more incidents of sexual crimes as well as better employment opportunities for women. On the other hand, districts with conservative values may exhibit low female workforce participation and low reporting of sexual crimes. District fixed effects also help control for intrinsic differences in law enforcement across states. δ_t represents time fixed effects that allow for possible structural differences in the economy and the evolution of cultural values across time. For instance, reporting of crimes and women's workforce participation might have gone up over time across all states. Finally, δ_{dt} represents district-level linear time trends that control for unobserved district-level characteristics that vary linearly over time and are related to district-level trends in female workforce participation. For instance, India has experienced uneven growth in urbanization across regions, and a greater degree of urbanization is likely to increase women's workforce participation as well as crimes against women. δ_{dt} would capture the district-specific linear trends in urbanization.

Table 2 reports the estimates corresponding to equation 1 using our sample of urban women in the age group 21-64 years. Column (1) reports the unconditional bivariate relationship between crimes against women and women's decision to work. The positive relationship indicates that districts reporting high sexual crimes also have high rates of female workforce participation. In the absence of controls for unobserved differences between districts, it perhaps reflects higher reporting of crimes in districts that have higher workforce participation of women.

Column (2) includes district fixed effects, ensuring that comparisons identifying the effect of sexual crimes are only made within (and not across) districts. With the inclusion of district fixed effects, the estimate indicates that an additional sexual crime per thousand women in a district is associated with a 5.7 percentage point reduction in the probability of working away from home. The subsequent columns sequentially include additional controls. Column (3) adds year fixed effects, Column (4) adds individual-specific controls (years of schooling and a quadratic in age), Column (5) includes household-specific controls (religious and caste indicators), and Column (6) accounts for district-level linear time trends. The coefficient for sexual crimes across Columns (3)-(5) differs negligibly, suggesting that district fixed effects possibly pick up most of the unobserved heterogeneity. The coefficients for other variables are also consistent with our expectations. For instance, the estimates for age indicate that work involvement increases with age at a decreasing rate. In addition, women belonging to the SC-ST groups are 11-14 percent point more likely to be involved in the workforce than the general caste women. Besides, women's workforce participation is positively associated with the years of schooling and negatively associated with the household size in all the specifications.

The inclusion of linear district trends in Column (6) strengthens the negative relationship between sexual crimes and workforce participation, implying that the linear trend captures time-varying district characteristics that increase both sexual crimes and women's workforce participation rates. The estimate in this full specification indicates that women are 15 percentage points less likely to work for one additional report of sexual crime per thousand women. At the mean rate of crime in the sample, approximately 0.13 crimes per thousand women, this translates to a 0.14 percent drop in women's workforce participation rate for a one percent increase in sexual crimes against women.

3.2 Placebo Checks

While district fixed effects, linear time trends, and the individual and household level covariates reduce the possibility of correlated unobservables, we cannot rule out the possibility that the negative association between crime rate and women's employment may be driven by non-linear time-varying district characteristics. For instance, poor labor market conditions may push men and women out of the market as well as increase sexual crimes. We conduct placebo tests using gender-neutral crimes and men's employment to investigate this possibility. Arguably, a worse labor market is likely to increase crimes of all types and not only sexual crimes. For instance, theft or kidnapping could also be on the rise. Moreover, an upturn or downturn in the labor market is likely to impact both men and women in their employment prospects.

As a first step, we estimate equation 1 using gender-neutral crimes such as thefts and murders instead of sexual crimes. The rationale is that poor economic conditions influence all types of crimes (Cantor and Land, 1985). Consequently, if the negative relationship in Table 2 is driven by poor labor market conditions, we should observe a similar pattern for gender-

neutral crimes. Conversely, if the threat of sexual assault drives the pattern in women's labor force participation, we should not find a negative association between women's labor force participation and gender-neutral crimes. We choose thefts and murders because both crimes do not have a stigma associated with them and hence are unlikely to be under-reported. This characteristic ensures that the coefficients are not mechanically attenuated by measurement error. In a second step, we examine the relationship between crimes against women and male labor force participation. The rationale is similar: if poor labor market conditions drive the relationship between sexual crimes and female workforce participation, we should observe a similar pattern with male workforce participation. Columns (1) and (2) report the outcomes from regressing workforce participation on thefts and murders, respectively. Column (3) reports the outcomes from estimating equation 1 on the sample of urban men aged 20-64. The coefficients are all close to zero implying negligible or no effect of gender-neutral crimes on women's employment or of sexual-crimes on men's employment.

3.3 Robustness Checks

The placebo results give us confidence in our baseline findings that higher sexual crimes deter women's participation in jobs away from home. In Tables 4 and 5, we conduct a series of further sensitivity checks to see if the results are robust to alternative empirical specifications, estimation sample, and variable definitions. Additionally, in Sections 3.3.2 and 3.3.3 we follow an Instrumental Variables approach and an analysis using bordering districts, respectively.

3.3.1 Sensitivity Checks

Table 4 reports regression outcomes from several modifications of Equation 1. Column (1) reproduces the outcome from Table 2 (Column (4)) for reference. Column (2) adds various time-varying district-level controls to account for changing economic and social conditions. Specifically, we include the male unemployment rate, the child sex-ratio, the fraction of men who completed middle school, and the fraction of girls getting married before the minimum legal marriageable-age. These measures are obtained by aggregating the NSS data. Column (3) accounts for district-level linear time trends in addition to the time-varying district characteristics in Column (2). We find that the estimates, after inclusion of district-level linear trends, are similar to our main findings in Table 4.

The analyses in Columns (2) and (3) are based on district-level aggregates constructed from the NSS data. However, aggregation based on NSS rounds is representative only for states and NSS-regions and not at the district level. Hence, we report analogous state-level regressions in Columns (4)-(6). Here, we measure the sexual-crime rate using a state-level analog of Equation 2. Using state-level aggregates also allows us to normalize the sexual crimes in each year by female populations in the respective survey year, as estimated from the NSS

data.[6] Column (4) reports the outcomes from estimating the base specification at the state-level. The coefficient indicates that additional crime per thousand women is associated with a 33.5 percentage point reduction in the probability of a woman working outside the home. This effect is robust to the inclusion of time-varying state-level characteristics in Column (5). As in district-level estimates, the coefficient size increases after accounting for state-level linear time trends. The state-level coefficients are similar in spirit to the district-level coefficients, although they are much larger in magnitude. However, state-level effects do not simply aggregate over district-level effects. Rather, state-level estimates are likely to be different from district-level estimates because of (a) externality effects across districts, and (b) differences in population growth rates across districts with different initial levels of female labor supply. The former means that increases in crime in one district could also discourage female labor supply in other districts of the state. While state-level estimates include this externality effect, district-level estimates do not. We explain (b) by comparing state-level and district-level estimates using a numerical example in Appendix table A6.

Table 5 further checks the sensitivity of our baseline estimates by altering the estimation sample and variable definitions. Column (1) reports the coefficients obtained by restricting to a younger estimation sample - urban women aged 20-50. Column (2) modifies the definition of FLFP by taking into account a woman's subsidiary activities in addition to her principal activity. Here, W_{idt} takes value one for women who engaged in work outside the home for a minimum of 30 days in the previous year and zero if they only engaged in domestic duties. This is in contrast to the baseline, where W_{idt} is one only for women who engaged in work outside the home for the major period during the previous year. Finally, Column (3) uses the sexual crime rate lagged by two years, instead of one, to allow for the possibility that the change in decision to join or exit the labor force might be slow. Overall, the estimates remain close to the baseline estimates across all specifications.

3.3.2 Instrumental Variable

In addition to unobserved heterogeneity, ordinary least squares estimates may be biased due to measurement error caused by under-reporting of sexual crimes. Under-reporting occurs due to two reasons. First, women from conservative societies may not report sexual crimes if they fear the stigma or mistrust the judicial system. UN-Women and ICRW (2013), for instance, find that a high proportion of women in the nation's capital Delhi confront the perpetrator rather than inform the police. Second, NCRB's crime reporting procedure may also result in under-reporting because sexual assaults that result in a victim's death are recorded only as murder (i.e., principal offense) to avoid double counting. Since murders are gender-neutral crimes and not recorded separately for women, the information about

[6] Census data provide us actual population figures, but it comes at the cost of lower variation as the census is only conducted once every ten years. With NSS data, we obtain more variation, but the population is only approximate. This data limitation presents a non-trivial trade-off. For district-level regressions, we prefer census data to estimate the female population since NSS is not representative at the district level. NSS aggregation is the obvious better choice for the state-level regressions since the surveys are representative at the state level and allow us to normalize the crime rate using female population estimates for the same year.

the accompanying sexual offenses is lost. This compilation procedure most likely affects the reporting of rapes since sexual harassment and molestation are usually non-fatal.

We employ two approaches to allay this concern. First, we use state-level policies governing alcohol accessibility to instrument for the instances of crimes against women. Second, we use the discontinuity in alcohol consumption policy at the Gujarat state border to proxy for the variation in sexual crimes in a contiguous-border analysis. Alcohol access policies are unlikely to affect the female labor force participation directly, but may affect sexual violence (Finney (2004), Brecklin and Ullman (2001)) through multiple channels. Alcohol consumption heightens emotional responses and aggressive behavior, making men more likely to commit sexual offenses in an inebriated state. At the same time, alcohol consumption impairs cognitive function and decision making, rendering intoxicated women more vulnerable to crimes (Abbey et al., 2001).

India is one of the few countries where alcohol-related laws are enforced at the state level, allowing us to exploit quasi-experimental variation across states. Some states completely prohibit the sale and consumption of alcohol. For instance, during our sample period, Gujarat, Mizoram, Nagaland, and Lakshadweep [7] exercised a complete ban. Among the states that permit alcohol consumption, the minimum legal drinking age (MLDA) for alcohol varies between 18-25 years. For all states in our sample, but Tamil Nadu, the MLDA policy has not changed over time. Tamil Nadu changed the MLDA from 18 years to 21 years in 2004. Despite the weak law enforcement and non-trivial evasion, policies limiting alcohol access have been shown to reduce the likelihood of consumption as well as instances of crimes against women in India. (Luca et al., 2015, 2019). Drinking age laws have also been linked to sexual crimes in other countries (Cook and Moore, 1993). As such, we use the differences in the drinking age laws across states and time to induce an exogenous variation in sexual crimes.

MLDA policies induce selective prohibition on specific age groups and create a variation in the fraction of men who are legally qualified to drink across states. We use this variation to construct the instrumental variable. In principle, our measure of the fraction of men legally eligible to drink could vary across districts. However, the non-representativeness of the NSS data at the district-level means that we can only construct representative measures of male and female populations at the state level. As shown in Table 4, the baseline results from the district-level analysis continue to hold in spirit when using a state-level variation. Hence, in what follows, the instrumental variable analysis that we conduct corresponds to columns (3)-(6) of Table 4.

The data for this analysis comes from all states and union territories except Jammu & Kashmir, Manipur, Karnataka, and Dadra & Nagar Haveli. We exclude Jammu & Kashmir as it was a Muslim majority state with the lowest alcohol consumption. We exclude Manipur because the alcohol consumption policy was not uniform within the state during the sample period. Manipur imposed a blanket prohibition before 2002, but lifted it in half of its districts through Manipur Liquor Prohibition (amendment) bill (2002). Since our popula-

[7] Lakshadweep permits consumption only on the island of Bangaram, which is an uninhabited island but has a bar.

tion estimates are not representative at the district level, we cannot measure the fraction of drinking-age men in Manipur. We exclude Karnataka because of the lack of clarity within the excise department regarding the minimum drinking purchase age. The legal drinking age is 21 as per Karnataka Excise Department (1967) and 18 as per the Karnataka Excise Act (1965). In practice, some bars serve those above age 18 while others refuse service to anyone below 21 (Report, 2016; Yadav, 2016). [8] Lastly, we skip Dadra & Nagar Haveli as we were unable to document its legal drinking age during the sample period.

We estimate the following equations using two-stage least squares.

$$\begin{aligned} W_{ist} &= \alpha_0 + C_{s,t-1}\alpha_1 + X_{st}\alpha_2 + \delta_s + \delta_t + \delta_{st} + \varepsilon_{ist} \\ C_{s,t-1} &= \gamma_0 + \gamma_1 z_{st} + X_{st}\gamma_2 + \theta_s + \theta_t + \theta_{st} + \omega_{st} \end{aligned} \tag{3}$$

where W_{ist} is an indicator taking value one if individual i from state s participates in the workforce outside home in the survey-year t and zero otherwise. $C_{s,t-1}$ denotes the sexual crime rate in the state s in the calendar year $t-1$, calculated as the sum of reported rape ($R_{s,t-1}$), molestation ($M_{s,t-1}$), and sexual harassment ($H_{s,t-1}$) normalized by the state-level female population ($F_{s,t}$) as follows:

$$C_{s,t-1} = \frac{R_{s,t-1} + M_{s,t-1} + H_{s,t-1}}{F_{s,t}} \times 1000$$

X_{st} represents time-varying state-level controls (male literacy, child sex-ratio, and fraction of girls getting married before the minimum legal marriageable-age), δ_s represents the state fixed effects, δ_t represents time fixed effects, and δ_{st} represents state-level linear time trends. z_{st} denotes the excluded instrument, defined as the fraction of men who are legally qualified to drink. Specifically, let M_{st} denote the total male population and $MLDA_{st}$ denote the minimum legal drinking age in the state s during the survey-year t. Then,

$$z_{st} = \frac{\sum_{i=1}^{M_{st}} \mathbf{I}(Age_i > MLDA_{st})}{M_{st}} \times 1000$$

The instrument z_{st} varies at the state-time level in the sample because (i) MLDA policies vary across states, (ii) demographic composition of the male population is different across states and time, and (iii) the state of Tamil Nadu changed its MLDA policy during the sample period adding a time-variation. In using z_{st} to instrument for sexual crime rate $C_{s,t-1}$, we assume that state policies governing the minimum legal drinking age and/or the age-distribution of men in a state do not directly affect women's employment outcomes, after controlling for state and time fixed effects and state-specific linear time trends.

Figure 5 explores the cross-section variation in alcohol-access laws and the drinking-age male

[8] Appendix table A4 provides the IV estimates including Karnataka in the sample assuming MLDA to be eighteen, according to the available documentation in Karnataka Excise Act (1965).

population across states in India. Panel (a) shows the state-wise minimum legal drinking age across states in the year 2011. Using the information on MLDA and age-distribution of men, Panel (b) depicts the state-wise variation in our instrumental variable, the fraction of men in legal drinking age, in 2011. Comparison of Figure 4 Panel (a) and Figure 5 Panel(d) shows that the states with a higher male drinking age population also witness higher instances of sexual crimes on average. Figure 6 further explores the first-stage relationship through a scatter plot between state-level sexual-crime rate and the fraction of men of legal drinking age between 2004-2011. The positive slope indicates that the states with a higher male drinking-age population also witness higher instances of sexual crimes per thousand women.

Table 6 reports the IV estimates from equation 3. The F-statistic from the first stage is 12.14, indicating that the IV is strongly correlated with the crimes against women. For comparison, we present the OLS and IV estimates of each specification[9]. Columns (1) and (2) control for state and year fixed effects. Columns (3) and (4) additionally include time-varying state characteristics that were controlled for in column (2) of Table 4. Finally, columns (5) and (6) additionally include state-level linear time trends. In each case, the IV estimates are larger than the OLS estimates. Given the large sample size and the strong first-stage correlation, this possibly indicates a downward bias in the OLS estimates due to measurement error. The OLS estimate in column (5) implies a 42 percent fall in the probability of women working away from home for an additional sexual crime per ten thousand women. In contrast, the IV estimates in column (6) imply a reduction of 61 percent. Overall, the results uphold our baseline findings that crimes against women act as a significant deterrent for women's workforce participation.

3.3.3 Contiguous Border Analysis

The instrumental variable estimates lend further support to our baseline findings. However, the data limitations restrict us to estimates based on state-level variations. Hence, in an alternative approach, we use alcohol policy discontinuity at the Gujarat border to proxy for district-level variation in sexual crimes.

Our estimation approach relies on the variation in potential ease of obtaining alcohol within Gujarat. Although Gujarat has prohibited the manufacture, storage, sale, and consumption of alcohol in the entire state since the 1960s, the intensity of the ban is likely to vary within the state due to the cross-state differences in alcohol laws at the porous Gujarat border. Since people residing in proximity to the non-ban states can easily buy alcohol outside of Gujarat, they are more likely to consume alcohol than people in districts located further away in Gujarat's interior. We use this variation in the potential ease of obtaining alcohol within Gujarat to conduct a contiguous-border analysis, and compare the female labor-force participation between districts of Gujarat that share a border among themselves but differ

[9]Since the first stage predicts crime at the state-time level based on variations in the instrument at the state-time level, we do not include the household and individual level characteristics from Table 2 in the IV estimation

in alcohol accessibility.

We begin by matching neighboring districts in the exterior and interior of Gujarat to form contiguous-border district pairs. Figure 7 presents the district map of Gujarat (as in the year 2000) to illustrate this process. The term 'exterior districts' describes the districts of Gujarat that share a border with a neighboring state where alcohol sale and consumption are legal. All remaining districts count as 'interior districts.' A contiguous-border district pair is a combination of an exterior and an interior district that share a common border. Note that an exterior (interior) district that shares a border with p distinct interior (exterior) districts appears in p contiguous-border district pairs. The district Bharuch, for instance, appears in three pairs: (1) Bharuch-Vadodara, (2) Bharuch-Narmada, and (3) Bharuch-Surat. Moreover, exterior (interior) districts that do not share a border with any interior (exterior) districts do not appear in any pair. Overall, we use data from thirteen districts that form twelve contiguous-border pairs.

In the estimation, we take a reduced-form approach and compare the female labor force participation in the exterior and the interior districts within contiguous-border pairs[10]. Comparing adjacent districts within Gujarat allows us to eliminate the time-invariant as well as time-varying state-level confounders that potentially affect both sexual crimes and women's workforce participation. Our implicit first stage is that the districts of Gujarat close to neighboring states would be more susceptible to sexual crimes when compared to districts in the interior of Gujarat due to variation in access to alcohol.

Our estimation equation is:

$$W_{idpt} = \lambda_0 + E_{dp}\lambda_1 + X_{idt}\lambda_2 + \eta_t + \eta_p + \nu_{idpt} \tag{4}$$

where p indexes adjacent district pairs and W_{idpt} is an indicator for workforce participation. E_{dp} is an indicator taking value one if district d from contiguous pair p is an exterior district and zero otherwise. X_{idt} represents the individual, household and district-level controls, η_t denotes year fixed effects, and η_p denotes contiguous district-pair fixed effects. The inclusion of η_p ensures that the comparisons are made within local economic areas that are adjacent and hence similar, except for the difference in potential alcohol accessibility. The identifying assumption is that the location of a district, interior or exterior, is uncorrelated with the other residual factors affecting workforce participation. Since alcohol-induced crimes are likely to be higher in Gujarat's exterior districts, we expect these districts to have lower workforce participation compared to the interior districts.

Table 7 presents results from the reduced form contiguous pair analysis. Column (1) compares the female workforce participation in the contiguous border districts without any controls. The results align with our expectations, and we observe a lower workforce participation rate

[10]The variation in access to alcohol comes from very few districts, making it difficult to conduct an instrumental variation estimation.

in the exterior districts. In particular, Column (1) indicates that women in the exterior districts are 4.1 percent point (or 29.4%) less likely to work outside homes than those in the interior districts. The estimates are similar when we include individual/household controls and district-level controls sequentially in columns (2) and (3).

3.4 Heterogeneity Analysis

We find that most of the estimates in our sensitivity analyses are larger than our baseline estimates. The estimates across various specifications range between 13.7%-15.4%. We choose the most conservative estimate in the full specification of the baseline model (Column 6 of Table 2) as our preferred estimate. At the same time though, the marginal effect of sexual crimes may vary systematically with various characteristics. Women from conservative societies, for instance, may require a larger reduction in sexual crimes to join the workforce, everything else remaining the same. On the other hand, women from low-income households may be less deterred by crimes as they face a higher opportunity cost of staying at home. We investigate such heterogeneity by estimating the following equation:

$$W_{idt} = \phi_0 + \phi_1 G_{idt} \times C_{d,t-1} + \phi_2 G_{idt} + \phi_3 C_{d,t-1} + \phi_4 X_{idt} + \delta_d + \delta_t + \delta_{dt} + \epsilon_{idt} \qquad (5)$$

where G_{idt} is an indicator taking value one for individuals belonging to group G, and zero otherwise. A positive and statistically significant coefficient on G indicates that in the absence of sexual crimes, women from group G are more likely to work outside homes than women in the base category. Moreover, a negative (positive) and significant coefficient on the interaction term indicates that the relationship between violence and workforce participation is stronger (weaker) for women from a group G as compared to others.

Figure 8 plots the predicted probability of workforce participation obtained from estimating equation 5 for different sections of women at various levels of the sexual-crime rate. The slope of the predicted-probability curve gives the marginal effect of the sexual crimes. The detailed regression outcomes are reported in Appendix Table A5.

Panel(a) examines whether urban and rural women respond to sexual crimes differently. To compare the marginal effects in the two sectors, we add rural women aged 21-64 to the estimation sample, thus yielding a higher sample size of 435,546. We estimate equation (3), defining G as one for urban women. Figure 8 shows that in contrast to urban women, rural women are more likely to participate in the workforce at any level of the sexual crime rate. Additionally, in contrast to the large negative effect on urban women, we obtain a trivial and statistically insignificant effect of sexual crimes on rural women. Several factors can explain this. Rural women are more likely to be driven into the workforce by necessity than opportunity and may be compelled to overcome their fear of crimes (Klasen and Pieters, 2012). Moreover, 75% of the rural women in the NSS sample are employed in the primary sector (mostly agricultural) jobs, as opposed to 15% urban women. Agricultural jobs require

women to work near their homes, so the probability of victimization while commute is low. Lastly, rural women may be less informed about sexual crimes considering the high illiteracy rate and low media coverage in rural India.

Panel(b) shows the responsiveness of women to sexual crimes based on their educational attainment. Apriori, the effect is ambiguous. On the one hand, a higher education level indicates a higher opportunity cost of not working if returns to education are positive. On the other hand, high educational attainment reflects high socioeconomic status and low marginal benefit of employment. Figure 8 shows that at each level of crime rate, women with more than ten years of schooling are significantly more likely to be engaged in the labor force. However, the marginal effect of sexual crimes between these groups is statistically indistinguishable, as indicated by the slopes of the two lines.

Panel(c) examines heterogeneity in response to sexual crimes by religion. The inhibitory effect of sexual crimes may vary for women with different cultural backgrounds depending on the value that their local society places on chastity. Since religion forms an important part of cultural identity, we explore the differential effect for Hindu women ($G = 1$) as compared to non-Hindu women. Figure 8 indicates that at lower levels of crime, both sections of women are equally likely to participate in the workforce. However, the slope is higher for non-Hindus, indicating that women from non-Hindu households are less likely to join the workforce in response to sexual crimes than Hindu women.

Panel (d) examines whether women of different age groups respond differently to the incidence of sexual crimes. Young women are more vulnerable to sexual crimes as compared to middle-aged women. Historically, around 40% of rape victims in India are in the age group 18-30 while less than 15% have been older than 30 years. Young women are also likely to face higher stigma costs of such crimes and may be more deterred by crimes. We examine this possibility by dividing our sample into two age groups: 21-30 and 30 above. Figure 8 shows that both sections of women respond negatively to higher crime rates. The interaction term reported in Table A5 is negative but statistically insignificant, indicating no significant difference in the deterring effect among the two age groups.

Finally, Panel (e) shows heterogeneity based on a household's income, as captured by a household's monthly per-capita expenditure (MPCE). Women from low-income households have a larger economic incentive to work and maybe less responsive to crimes. Conversely, women from high-income households may encounter safer job opportunities and may not be affected by high crimes. Figure 8 shows that women from poorer households have higher workforce participation at any level of sexual crimes. Table A5 Column 5 indicates that the interaction term is statistically insignificant, so the marginal effects are quite similar for the two groups.

Overall, we do not find evidence for any notable heterogeneity in women's response to sexual crimes. Women across religion, region, income, and education levels are likely to be significantly deterred from joining the labor force when the sexual crimes against women go up.

4 Conclusion

This paper is motivated by two very disturbing trends concerning women's vulnerability and (lack of) empowerment in India - a widespread and increasing trend in sexual crimes against women and a low and decreasing rate of women's workforce participation. We estimate the extent to which low labor force participation of women in India can be explained by high rates of sexual crimes against women. We find a robust negative and significant relationship between crimes against women and their participation in jobs away from home. Our preferred specification shows that a one percent increase in crime against women (roughly 1 additional crime per ten thousand women) in a district decreases the expected probability of working by 13.7 percentage on average. The inhibitory effect is more substantial for women in urban and non-Hindu households. To the extent that the reporting of crimes suffers from measurement error, we expect this estimate to be a lower bound of the absolute effect of crimes on female workforce participation. Our results hold up to a series of falsification exercises, sensitivity checks, and instrumental variable analysis using variations in alcohol purchase policies. Overall, our results are consistent with the hypothesis that the fear of sexual crimes compels women to quit the workforce.

Our evidence underlines the importance of accounting for the high crimes against women while designing policies to increase women's labor force participation. One way to understand the importance of addressing crimes against women to increase women's labor force participation is to compare it with other well-established causes of women's withdrawal from the labor force and policies adopted to prevent such instances. The existing literature underscores childbearing as the most important factor preventing women from participating in the labor force. In line with this understanding, an overwhelming thrust in policies geared towards encouraging female labor force participation has been on introducing and enforcing maternity and childcare benefits across the world. While paid parental leaves and facilitating childcare are likely to reduce the cost of working and encourage women to join the labor force in many countries, it is unlikely to be a one size fit all policy. In India and other countries with higher crimes against women, reducing the cost of working additionally involves safer means of traveling to work. To understand the relative importance of crimes against women vis-a-vis childbearing as potential causes preventing women from joining the labor force, we consider the estimates in Bloom et al. (2009). To our knowledge, Bloom et al. (2009) is the only study that provides a linear estimate of the effect of an additional child on female labor supply across 97 countries, including India. In the absence of any study providing estimates on motherhood penalty specific to India, Bloom et al. (2009) is the closest comparison to our study. They identify the effect of fertility on female labor force participation using variation in abortion legislation across these countries as an instrument for fertility. Their estimates imply a reduction in labor supply of 13.4% (or 7.5 percentage points) for each additional child born.[11] Our estimates in this paper indicate a comparable decline in women's labor supply, of about 9.4%, for each additional crime per ten thousand women, which is roughly the average rate of crime against women in our sample.

[11] These estimates are obtained using the numbers from Table 8 of Bloom et al. (2009).

To sum up, the penalty of an additional crime per thousand women is close to the motherhood penalty in terms of labor lost. This is quite remarkable when considering that addressing crime against women is an important policy intervention in its own right. The economic benefits in terms of potential increases in women's labor supply, which we estimate in this paper, are over and above the ethical and social imperatives that primarily drive policies to reduce crimes against women.

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Table 1: Summary statistics across different time periods

Panel (a): District Characteristics	2003	2006	2008	2010	Total
Sexual Crimes (per 1000 women)	0.14	0.12	0.14	0.14	0.13
	(0.12)	(0.10)	(0.11)	(0.12)	(0.11)
Thefts (per 1000 women)	0.42	0.40	0.46	0.46	0.43
	(0.55)	(0.49)	(0.57)	(0.60)	(0.56)
Murders (per 1000 women)	0.07	0.06	0.06	0.06	0.06
	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Child Sex Ratio (F/M)	0.98	0.95	1.00	1.08	1.00
	(0.38)	(0.32)	(0.54)	(1.63)	(0.90)
Girl-Child Marriage Ratio	0.01	0.01	0.00	0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Male Unemployment Rate	0.02	0.02	0.02	0.02	0.02
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Male Middle-school Completion Rate	0.18	0.20	0.24	0.26	0.22
	(0.08)	(0.09)	(0.10)	(0.10)	(0.10)
Observations	561	563	563	566	2253
Panel (b): Individual/HH Characteristics	2004-05	2007-08	2009-10	2011-12	Total
Workforce participation	0.19	0.15	0.16	0.16	0.16
	(0.39)	(0.36)	(0.36)	(0.37)	(0.37)
Age	37.19	38.26	37.86	38.11	37.86
	(11.01)	(11.47)	(10.97)	(11.06)	(11.15)
Schooling	6.26	7.07	7.27	7.58	7.03
	(5.70)	(5.79)	(5.79)	(5.83)	(5.80)
Household size	5.55	5.26	5.22	5.13	5.29
	(2.76)	(2.67)	(2.61)	(2.52)	(2.65)
Hindu	0.75	0.75	0.74	0.74	0.75
	(0.43)	(0.43)	(0.44)	(0.44)	(0.44)
Scheduled tribe	0.07	0.08	0.07	0.08	0.07
	(0.25)	(0.26)	(0.25)	(0.26)	(0.26)
Scheduled caste	0.14	0.12	0.13	0.13	0.13
	(0.35)	(0.33)	(0.34)	(0.34)	(0.34)
OBC	0.35	0.33	0.36	0.38	0.36
	(0.48)	(0.47)	(0.48)	(0.49)	(0.48)
Observations	45207	47719	42030	42360	177316

Source: NCRB(Panel 1) and NSS(Panel 2) multiple rounds, Own calculations

Notes: Upper panel reports the mean and standard deviation (in parenthesis) for different crimes in aggregated districts. Lower panel reports mean and standard deviation (in parenthesis) of individual and household characteristics of urban women in age-group 21-64. For a survey round beginning in year t, the table summarizes the crimes in calendar year $t-1$ (see table A1 for details).

Table 2: Crime against women and female workforce participation: Baseline

Dependent Variable: Workforce participation of women						
	None	+ District FE	+ Time FE	+ Individual	+ Household	+ Dist Trend
	(1)	(2)	(3)	(4)	(5)	(6)
Crimes	0.093***	-0.057**	-0.063**	-0.060**	-0.063**	-0.150***
	(0.030)	(0.023)	(0.027)	(0.026)	(0.027)	(0.039)
Age				0.005***	0.004***	0.004***
				(0.001)	(0.001)	(0.001)
Age squared				-0.000***	-0.000***	-0.000***
				(0.000)	(0.000)	(0.000)
Schooling				0.005***	0.006***	0.006***
				(0.000)	(0.000)	(0.000)
Hindu = 1					0.013***	0.013***
					(0.004)	(0.004)
Scheduled tribe = 1					0.146***	0.146***
					(0.012)	(0.012)
Scheduled caste = 1					0.110***	0.111***
					(0.006)	(0.006)
OBC = 1					0.014***	0.013***
					(0.004)	(0.004)
Household size					-0.013***	-0.013***
					(0.001)	(0.001)
HH monthly exp					-0.000	-0.000
					(0.000)	(0.000)
Constant	0.145***	0.167***	0.168***	0.070***	0.101***	0.113***
	(0.005)	(0.004)	(0.004)	(0.022)	(0.023)	(0.023)
Observations	177,316	177,316	177,316	177,316	177,316	177,316
R-squared	0.001	0.045	0.046	0.057	0.076	0.084
District FE	No	Yes	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	Yes	Yes	Yes
District Linear Trend	No	No	No	No	No	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. The sample consists of urban women in the age group 21-64. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Crime against women and female workforce participation: Placebo

Dependent Variable: Workforce participation of women			
	Females		Males
	Theft	Murder	Baseline
	(1)	(2)	(3)
Crimes	-0.003	-0.173	-0.001
	(0.012)	(0.142)	(0.010)
Age	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.000)
Age-sq	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
schooling	0.006***	0.006***	0.001***
	(0.000)	(0.000)	(0.000)
Hindu = 1	0.013***	0.013***	0.001
	(0.004)	(0.004)	(0.001)
Scheduled tribe = 1	0.146***	0.146***	0.003
	(0.012)	(0.012)	(0.003)
Scheduled caste = 1	0.110***	0.110***	0.004***
	(0.006)	(0.006)	(0.001)
OBC = 1	0.013***	0.014***	0.003***
	(0.004)	(0.004)	(0.001)
Household size	-0.013***	-0.013***	-0.001***
	(0.001)	(0.001)	(0.000)
mpce	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Constant	0.094***	0.102***	0.920***
	(0.027)	(0.026)	(0.008)
Observations	177,316	177,316	108,664
R-squared	0.083	0.083	0.029
Time FE	Yes	Yes	Yes
District FE	Yes	Yes	Yes
District Linear Trend	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations
Notes: Linear probability models. The sample consists of urban women in the age group 21-64. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: Crime against women and female workforce participation: Robustness

Dependent Variable: Workforce participation of women						
	District-level			State-level		
	Baseline (Col 5)	+ Dist Controls	+ Dist Trend	Baseline (Col 5)	+ State Controls	+ State Trend
	(1)	(2)	(3)	(4)	(5)	(6)
Crimes	-0.063**	-0.065**	-0.150***	-0.335***	-0.246**	-0.499***
	(0.027)	(0.027)	(0.036)	(0.112)	(0.103)	(0.110)
Age	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Schooling	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Hindu = 1	0.013***	0.013***	0.013***	0.013***	0.014***	0.014***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Scheduled tribe = 1	0.146***	0.146***	0.146***	0.139***	0.139***	0.139***
	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)	(0.013)
Scheduled caste = 1	0.110***	0.110***	0.111***	0.107***	0.107***	0.107***
	(0.006)	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)
OBC = 1	0.014***	0.014***	0.014***	0.012**	0.012**	0.012**
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Household size	-0.013***	-0.013***	-0.013***	-0.013***	-0.013***	-0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HH monthly exp	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.101***	0.093***	0.104***	0.143***	0.192***	0.217***
	(0.023)	(0.023)	(0.023)	(0.026)	(0.036)	(0.033)
Observations	177,316	177,316	177,316	177,316	177,316	177,316
R-squared	0.076	0.077	0.084	0.062	0.063	0.064
State/District FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
State/District Controls	No	Yes	Yes	No	Yes	Yes
State/District Linear Trend	No	No	Yes	No	No	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. The sample consists of urban women in the age group 21-64. District/State level control variables include male unemployment rate, child sex-ratio, fraction of men who completed middle-school, and the fraction of girls married before the minimum legal marriageable-age. Robust standard errors presented in parentheses are clustered by district and year in Columns (1)-(3), and by by state and year in Columns (4)-(6). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Crime against women and female workforce participation: Robustness

Dependent Variable: Workforce participation of women			
	Ages 20-50	Alternative FLFP	Crimes(t-2)
	(1)	(2)	(3)
Crimes	-0.176***	-0.138***	-0.156***
	(0.041)	(0.044)	(0.041)
Age	-0.002	0.005***	0.004***
	(0.002)	(0.001)	(0.001)
Age squared	0.000	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
Schooling	0.007***	0.006***	0.006***
	(0.001)	(0.000)	(0.000)
Hindu = 1	0.015***	0.013***	0.013***
	(0.005)	(0.004)	(0.004)
Scheduled tribe = 1	0.144***	0.150***	0.146***
	(0.013)	(0.012)	(0.012)
Scheduled caste = 1	0.106***	0.116***	0.110***
	(0.006)	(0.006)	(0.006)
OBC = 1	0.012***	0.015***	0.013***
	(0.004)	(0.004)	(0.004)
Household size	-0.013***	-0.013***	-0.013***
	(0.001)	(0.001)	(0.001)
HH monthly exp	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Constant	0.213***	0.113***	0.113***
	(0.037)	(0.024)	(0.024)
Observations	150,617	177,316	177,316
R-squared	0.087	0.082	0.084
Time FE	Yes	Yes	Yes
State/District FE	Yes	Yes	Yes
State/District Linear Trend	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. The sample consists of urban women in the age group 21-64. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Crime against women and female workforce participation: Instrumental Variable

Dependent Variable: Workforce participation of women						
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Crimes	-0.322**	-0.449**	-0.211*	-0.323**	-0.476***	-0.682**
	(0.124)	(0.198)	(0.110)	(0.160)	(0.111)	(0.264)
Child sex ratio			-0.114***	-0.111***	-0.086***	-0.074**
			(0.034)	(0.034)	(0.025)	(0.029)
Male unemployment			0.963***	0.853***	1.098***	0.897**
			(0.281)	(0.298)	(0.258)	(0.384)
Girl-child marriage ratio			0.276	0.266	-1.316*	-1.196
			(0.361)	(0.386)	(0.791)	(0.821)
Constant	0.200***	0.160***	0.267***	0.291***	0.285***	0.247***
	(0.018)	(0.027)	(0.030)	(0.048)	(0.027)	(0.089)
Observations	158,468	158,468	158,468	158,468	158,468	158,468
R-squared	0.032	0.032	0.033	0.033	0.033	0.033
First Stage F-stat	-	36.696	-	33.356	-	12.135
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
State Linear Trend	No	No	No	No	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

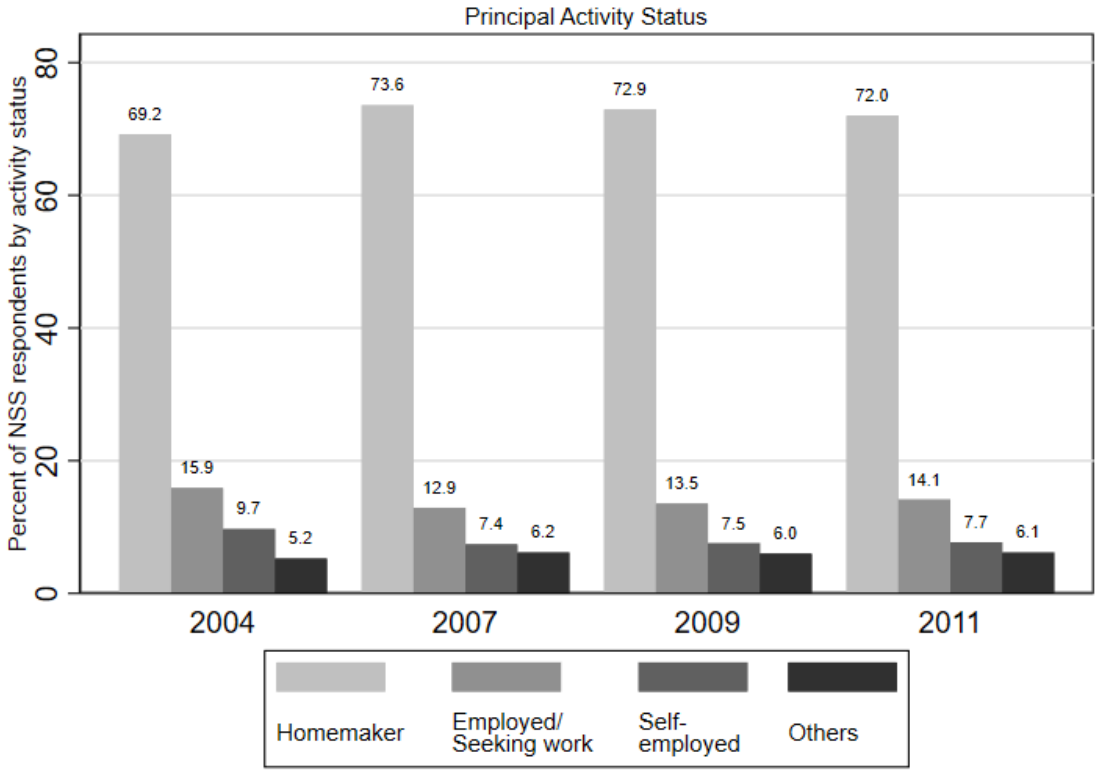
Notes: Linear probability models. The sample consists of urban women in the age group 21-64 in all the states and UTs excluding Jammu & Kashmir, Manipur, Karnataka, and Dadra & Nagar Haveli. Robust standard errors presented in parentheses are clustered by state and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: Contiguous-pair analysis in Gujarat

Dependent Variable: Workforce participation of women			
	No controls	+ Individual/ HH Controls	+ District Controls
	(1)	(2)	(3)
Exterior-district	-0.041**	-0.052***	-0.051***
	(0.019)	(0.019)	(0.019)
Constant	0.162***	0.029	0.018
	(0.025)	(0.116)	(0.139)
Observations	5,746	5,746	5,746
R-squared	0.024	0.087	0.088
Contiguous Pair FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Individual Controls	No	Yes	Yes
HH Controls	No	Yes	Yes
District Controls	No	No	Yes

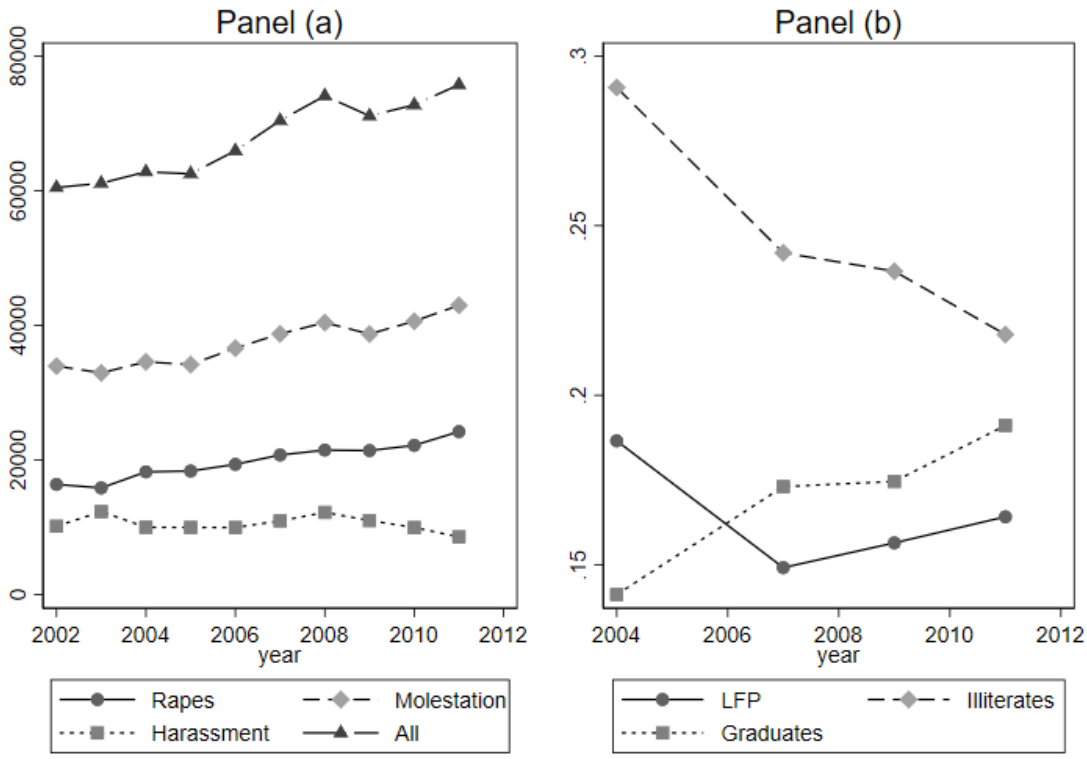
Source: NSS and NCRB multiple rounds, own calculations
Notes: Linear probability models. The sample consists of urban women in the age group 21-64. Exterior districts are the districts of Gujarat that share a border with a neighboring state where alcohol sale and consumption are legal. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Figure 1: National trends in women's principal activity status



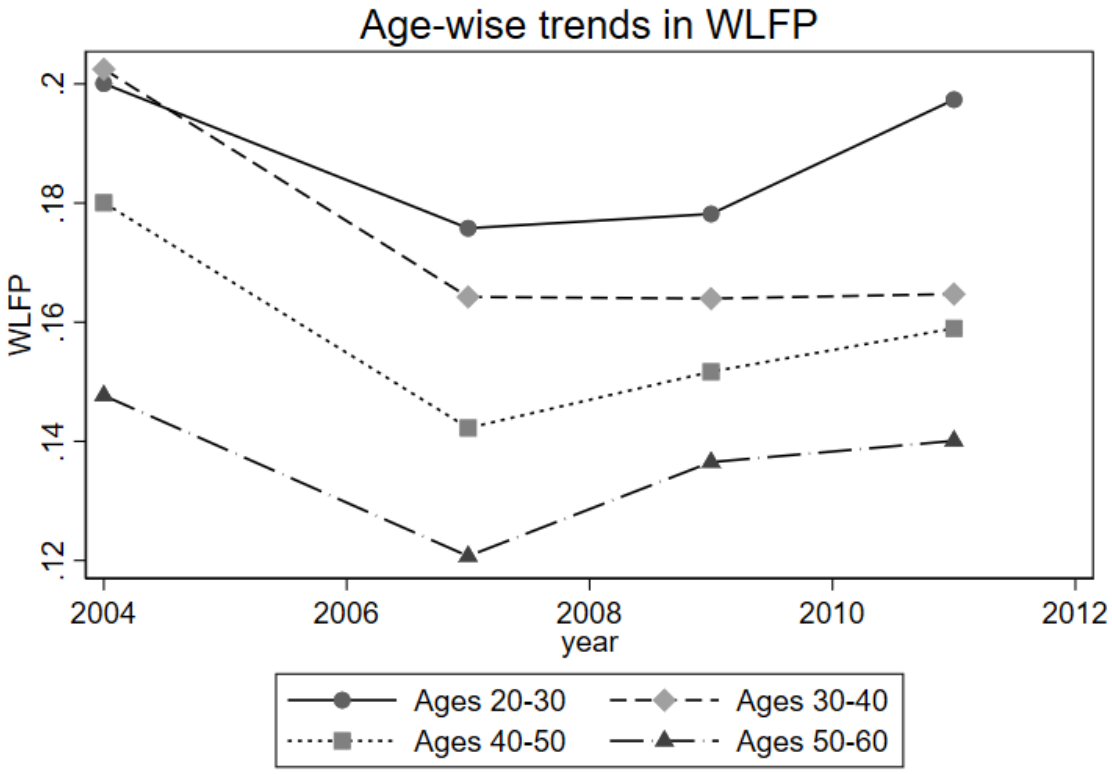
Source: NSS data multiple rounds, own calculations
Notes: The figure shows the distribution of urban women in the age group 21-64 across different principal activities.

Figure 2: National trends in sexual crimes, women's education and LFP



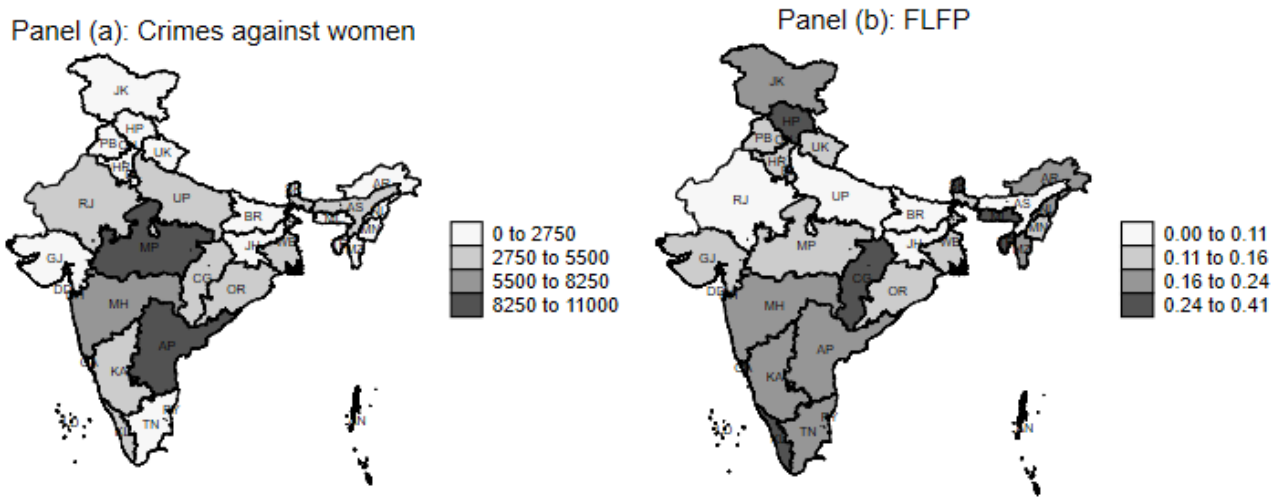
Source: NSS and NCRB data multiple rounds, own calculations
Notes: Panel (a) describes the trends in total registered cases of rapes, molestation and sexual harassment in the country during 2002-2011. Panel (b) shows the trend in percent of urban women (age group 21-64) employed in workforce, percent of illiterate women, and percent of women with at least graduate level education between NSS survey years 2004 and 2011.

Figure 3: National trends in women's workforce participation for different age groups



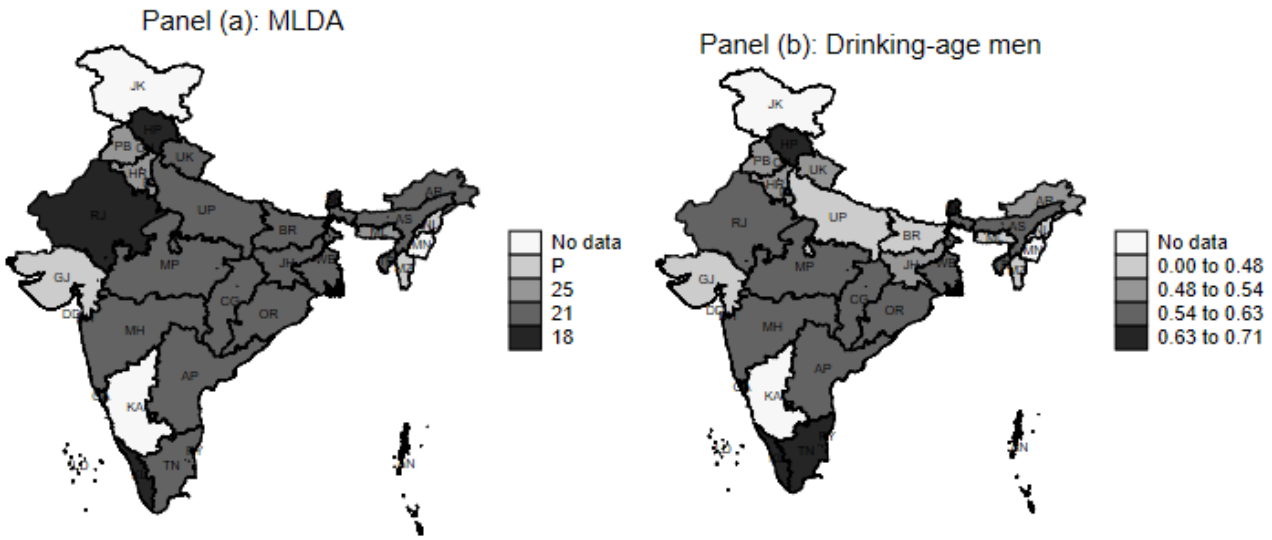
Source: NSS data multiple rounds, own calculations
Notes: The figure shows the age-wise trend in percent of urban women employed in workforce between survey years 2004 and 2011. Workforce participation has stagnated across all age-groups during the sample period.

Figure 4: State-wise sexual crimes and women's workforce participation



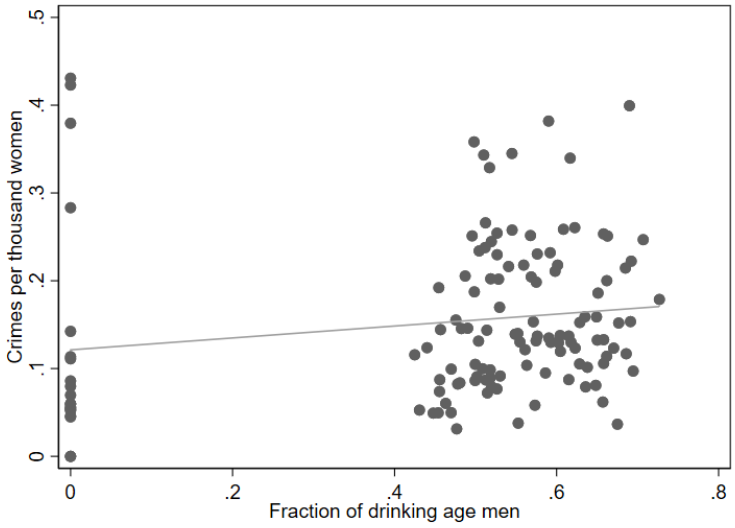
Source: NSS and NCRB data multiple rounds, own calculations
Notes: Panel (a) shows the reported sexual crimes (rapes, molestation, sexual harassment) per thousand women in 2010. Panel (b) reports the percent of urban women (age group 21-64) employed in the workforce in the survey year 2011. Darker shades indicate higher values.

Figure 5: State-wise MLDA and fraction of drinking-age men



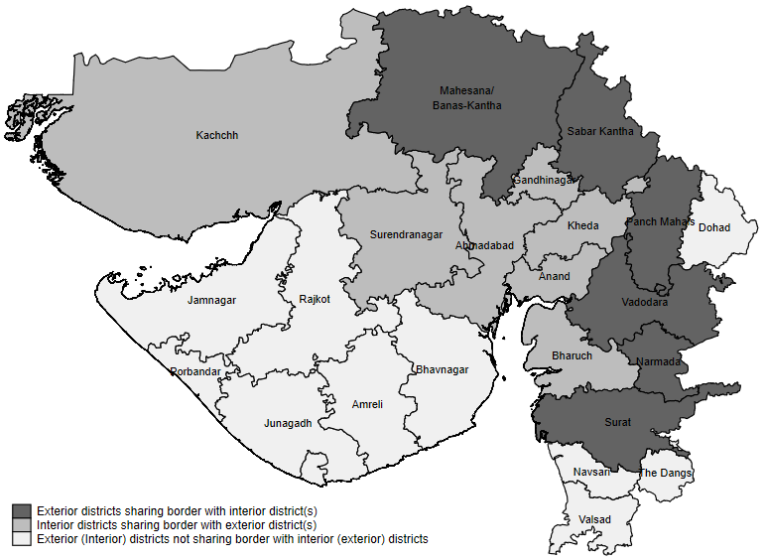
Source: NSS and NCRB data multiple rounds, own calculations
Notes: Panel (a) reports the state-wise minimum legal alcohol drinking age in the year 2011. Panel (b) reports the fraction of men in legal drinking age in 2011. Darker shades indicate higher values.

Figure 6: First-stage Correlation



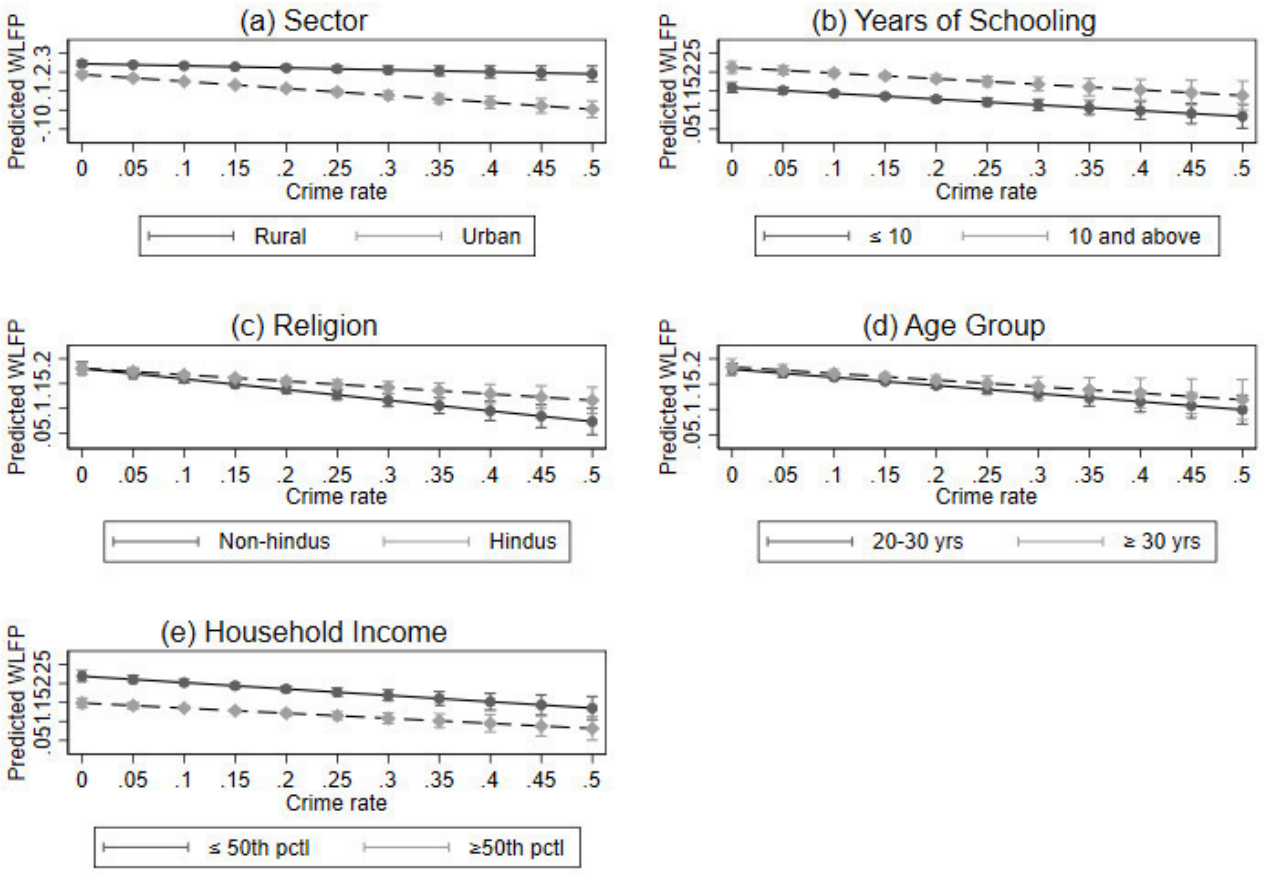
Source: NSS data multiple rounds, own calculations
Notes: The figures shows a scatter plot between fraction of drinking-age men and crimes against women across states pooling the observations over 2004-2011. A fraction of zero corresponds to the states that prohibit the consumption of alcohol.

Figure 7: Districts of Gujarat as in 2000



Notes: The figure shows the districts of Gujarat as in the year 2000. Parts of districts Mahesana and Banas Kantha were split to form a new district named Patan in the early 2000s. The analysis combines these districts to maintain geographical consistency across years. The analysis excludes districts Dahod, Navsari, Dangs, and Valsad as they do not share a border with any interior districts.

Figure 8: Heterogenous treatment effects



Notes: The figure plots predicted probability of workforce participation at each level of sexual-crime rate for women of different sectors (Panel (a)), years of schooling (Panel (b)), religion (Panel (c)), age-group (Panel (d)), household income (Panel (e)). Predicted probabilities are constructed by estimating specification 5.

Appendix

Table A1: NCRB and NSS Data

NSS		NCRB	
Round	Survey Year *(t)*	Crimes year *(t-1)*	Crimes year *(t-2)*
61	2004-2005	2003	2002
64	2007-2008	2006	2005
66	2009-2010	2008	2007
68	2011-2012	2010	2009

Table A2: Minimum legal drinking age across states in India

S.No.	STATE	2003	2006	2008	2010
1	A&N ISLANDS	18	18	18	18
2	ANDHRA PRADESH	21	21	21	21
3	ARUNACHAL PRADESH	21	21	21	21
4	ASSAM	21	21	21	21
5	BIHAR	21	21	21	21
6	CHANDIGARH	25	25	25	25
7	CHHATTISGARH	21	21	21	21
8	DAMAN & DIU	21	21	21	21
9	DELHI	25	25	25	25
10	GOA	21	21	21	21
11	GUJARAT	P	P	P	P
12	HARYANA	25	25	25	25
13	HIMACHAL PRADESH	18	18	18	18
14	JHARKHAND	21	21	21	21
15	KERALA	18	18	18	18
16	LAKSHADWEEP	P	P	P	P
17	MADHYA PRADESH	21	21	21	21
18	MAHARASHTRA	21	21	21	21
19	MEGHALAYA	25	25	25	25
20	MIZORAM	P	P	P	P
21	NAGALAND	P	P	P	P
22	ORISSA	21	21	21	21
23	PUDUCHERRY	18	18	18	18
24	PUNJAB	25	25	25	25
25	RAJASTHAN	18	18	18	18
26	SIKKIM	18	18	18	18
27	TAMIL NADU	18	21	21	21
28	TRIPURA	21	21	21	21
29	UTTAR PRADESH	21	21	21	21
30	UTTARAKHAND	21	21	21	21
31	WEST BENGAL	21	21	21	21

Source: State Excise Departments
Notes: Table highlights the minimum legal drinking age in selected states of India.
'P' refers to a blanket prohibition.

Table A3: Summary statistics across different time periods

State Characteristics	2003	2006	2008	2010	Total
Sexual Crimes (per 1000 women)	0.14	0.15	0.17	0.16	0.16
	(0.10)	(0.09)	(0.10)	(0.11)	(0.10)
Child Sex Ratio (F/M)	0.93	0.95	0.92	0.92	0.93
	(0.18)	(0.12)	(0.19)	(0.13)	(0.16)
Girl-Child Marriage Ratio	0.01	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)
Male Unemployment Rate	0.03	0.03	0.03	0.03	0.03
	(0.03)	(0.02)	(0.02)	(0.04)	(0.03)
Male Middle-school Completion Rate	0.22	0.25	0.29	0.30	0.26
	(0.09)	(0.09)	(0.10)	(0.09)	(0.10)
Observations	35	35	35	35	140

Source: NSS and NCRB multiple rounds, Own calculations

Notes: The table reports the mean and standard deviation (in parenthesis) for state-level characteristics. For a survey round beginning in year t, the table summarizes the crimes in calendar year $t-1$ (see table A1 for details).

Table A4: Crime against women and female workforce participation: Instrumental Variable

Dependent Variable: Workforce participation						
VARIABLES	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Crimes	-0.312***	-0.403*	-0.201*	-0.299*	-0.463***	-0.728**
	(0.119)	(0.207)	(0.104)	(0.167)	(0.111)	(0.303)
Child sex ratio			-0.111***	-0.107***	-0.085***	-0.070**
			(0.035)	(0.035)	(0.026)	(0.030)
Male unemployment			1.027***	0.939***	1.163***	0.903**
			(0.280)	(0.304)	(0.264)	(0.402)
Girl-child marriage ratio			0.094	0.085	-1.945**	-1.777*
			(0.405)	(0.428)	(0.933)	(0.991)
Constant	0.202***	0.245***	0.267***	0.193***	0.287***	0.252***
	(0.017)	(0.025)	(0.032)	(0.042)	(0.029)	(0.092)
Observations	167,159	167,159	167,159	167,159	167,159	167,159
R-squared	0.031	0.031	0.031	0.031	0.032	0.032
F-stat	-	37.917	-	37.264	-	9.706
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
State Linear Trend	No	No	No	No	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. The sample consists of urban women in the age group 21-64 in all states and UTs excluding Jammu & Kashmir, Manipur, Karnataka, and Dadra & Nagar Haveli. Robust standard errors presented in parentheses are clustered by state and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A5: Crimes against women and female workforce participation: Heterogeneity Analyses

	Urban	Schooling ≥ 10 years	Hindu	Age 21-30	HH MPCE ≥ 50th pctl
	(1)	(2)	(3)	(4)	(5)
Group × Crimes	-0.201***	0.007	0.086***	0.014	0.037
	(0.051)	(0.056)	(0.022)	(0.053)	(0.035)
Group	-0.063***	0.053***	-0.000	0.026***	-0.070***
	(0.008)	(0.008)	(0.005)	(0.008)	(0.007)
Crimes	0.008	-0.066**	-0.127***	-0.072**	-0.085***
	(0.051)	(0.033)	(0.028)	(0.036)	(0.032)
Age	0.017***	0.004***	0.004***		0.006***
	(0.001)	(0.001)	(0.001)		(0.001)
Age squared	-0.000***	-0.000***	-0.000***		-0.000***
	(0.000)	(0.000)	(0.000)		(0.000)
Schooling	0.001***		0.006***	0.007***	0.008***
	(0.000)		(0.000)	(0.000)	(0.000)
Hindu = 1	0.030***	0.018***		0.012***	0.014***
	(0.004)	(0.004)		(0.004)	(0.004)
Scheduled tribe = 1	0.171***	0.136***	0.146***	0.148***	0.141***
	(0.008)	(0.012)	(0.012)	(0.012)	(0.012)
Scheduled caste = 1	0.128***	0.098***	0.110***	0.112***	0.102***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
OBC = 1	0.031***	0.006	0.013***	0.015***	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Household size	-0.014***	-0.013***	-0.013***	-0.013***	-0.009***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
HH monthly exp	-0.000	-0.000	-0.000	-0.000	
	(0.000)	(0.000)	(0.000)	(0.000)	
Constant	-0.079***	0.143***	0.103***	0.136***	0.070***
	(0.017)	(0.024)	(0.024)	(0.008)	(0.023)
Observations	435,546	177,316	177,316	177,316	177,316
R-squared	0.189	0.073	0.077	0.075	0.082
Time FE	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. Sample consists of urban women between age group 21 to 64. Age group 31-64 forms the reference category in column 4. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table A6: Numerical Example Comparing District and State-level Estimates

	$t=1$, crime rate= 0					$t=2$, crime rate = 0.1		
District	F_1	W_1	$FLFP_1$	g	$\Delta FLFP$	$FLFP_2$	F_2	W_2
Case (i): Population grows by a factor of 2 in both districts.								
A	40	3	7.5	2	-1.5	6.0	80	4.8
B	40	8	20.0	2	-1.5	18.5	80	14.8
Total	80	11	13.8	2	**-1.5**	12.3	160	19.6
Case (ii): Population growth is higher in district A.								
A	40	3	7.5	2	-1.5	6.0	80	4.8
B	40	8	20.0	1.6	-1.5	18.5	64	11.8
Total	80	11	13.8	1.8	**-2.2**	11.6	144	16.6
Case (iii): Higher dispersion in $FLFP_1$ across districts.								
A	40	3	7.5	2	-1.5	6.0	80	4.8
B	40	15	37.5	1.6	-1.5	36.0	64	23.0
Total	80	18	22.5	1.8	**-3.2**	19.3	144	27.8

Notes: Consider a two-period set-up with two districts, A and B. For each district d during period t, let F_t^d and denote the total women and W_t^d denote the total women in workforce. The district-level female labor force participation rate, in any period t, is $FLFP_t^d = W_t^d/F_t^d$. Correspondingly, the state-level female labor force participation rate can be obtained by aggregating over the district-level rates ($FLFP_t^S = W_t^A + W_t^B)/(F_t^A + F_t^B) * 100$). In the first period ($t = 1$), each district d comprises 40 women ($F_1^d = 40$) and records no sexual crimes (crime rate = 0). However, district B differs from A in that B has a higher number of working women ($W_1^B > W_2^A$) and hence a higher level of female labor force participation rate ($FLFP_1^B > FLFP_1^A$). In period 2, the population in each district rises by a factor of g^d, and the sexual crime rate rises by 10 percentage points. Based on the estimates from our baseline framework ($\Delta FLFP^d = 1.5$), the workforce participation of women falls by 1.5 percent points in both districts. Using these estimates, in turn, we obtain the state level change in female labor force participation rate ($\Delta FLFP^S$) for a 10 percentage points increase in crime against women across the state. The extent to which the magnitude of the state-level effect differs from that of the district-level estimates depends on the variances in initial female labor supply and the population growth rate across districts. We explain this using three different possibilities which can lead to higher state-level estimates compared to district-level estimates. (i) The population grows at the same rate in both districts ($g^A = g^B$). In this situation, the district-level and state-level estimates coincide. (ii) The population grows at a slower rate when relatively more women participate in the labor force ($g^A > g^B$). In this situation, the state-level estimate of $\Delta FLFP$ is higher. (iii) The population growth rate varies as in (ii) but there is a larger gap in the initial female labor supply across the districts ($FLFP_1^B >> FLFP_1^A$). In this situation, the state-level estimates are even higher.