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Holi crimes

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Tinbergen Institute Discussion Paper

Holi Crimes

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Holi Crimes*

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Abstract

A significant number of women experience physical or sexual violence throughout their lives, with a considerable portion of such incidents occurring in public spaces. Harmful social norms emphasizing men's power over women have been highlighted as one crucial culprit. We study a public festivity in India, Holi (the festival of colors), where a common phrase: “Bura na mano Holi Hai” (Don't feel offended, it's Holi) has been misappropriated by many to justify inappropriate behavior. Leveraging different dates of the celebrations based on the lunar calendar, we document a dramatic increase of over 170% assaults against women during Holi. We analyze how perpetrators' and victims' gender norms drive violence against women. First, we find that Holi exacerbates existing attitudes towards violence against women, where there is higher violence in districts where men believe that violence against women is justified. Second, we find a male backlash effect, where there is higher violence against women in districts where women believe that violence against women is inappropriate. While patriarchal norms influence reporting behavior and women's mobility, neither underreporting nor reduced mobility during Holi appear to be the main drivers of the second effect. Overall, this paper highlights the critical role of social norms and gender imbalances in shaping violence against women, underscoring the urgent need for intervention.

JEL codes: J16, K14, K42, O12, Z10.

Keywords: Violence against women, social norms, street harassment.

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“Bura na mano Holi Hai”
(Don’t feel offended, it’s Holi).

1 Introduction

Violence against women (VAW) is ubiquitous. According to the World Health Organization, over one-third of women globally have experienced physical and/or sexual violence at least once in their lives. Such incidents often occur in crowded public spaces like public transport, festivals, or carnivals.¹ In fact, public places have been reported as the most frequent location of respondents’ first experience with sexual harassment (Harassment, 2018). Moreover, this high level of street harassment perpetuates gender inequalities, restricting women’s mobility and access to public spaces. Consequently, it affects their educational choices and labor market outcomes (Borker, 2021; Jayachandran, 2021), ultimately diminishing their ability to fully participate in society.

Among numerous reasons for VAW, harmful social norms have been argued as a crucial potential root of the problem. In some societies, especially in developing countries, violence and harassment against women and girls are often seen as justified and acceptable.²

For instance, 35% of male respondents surveyed across 91 countries believe that violence against women is justified (UNICEF, 2023) and even a similar share (34%) of women justify violence against their own gender (see Figure A.1 in the online Appendix). Despite this, little research has been conducted on how social norms impact violence against women in general, and even less regarding incidents committed in public places.

Studies on VAW have mainly focused on domestic violence within the home, with few examining the role of social norms in this form of violence (Tur-Prats, 2019; González and Rodríguez-Planas, 2020; Alesina et al., 2021). Yet, VAW in public places is distinct from intimate partner violence, often perpetrated by strangers and often in the presence of witnesses or bystanders. Moreover, several instances of VAW in public places are often socially tolerated. This suggests that these offenses may be particularly influenced by social norms and may respond differently to women’s and men’s beliefs about VAW compared to violence within the household.³

This paper aims to fill this gap in the literature by examining VAW in public places and the role played by gender norms in perpetuating it. Studying the causal impact of social norms on VAW is challenging as norms cannot be randomly distributed across society. To analyze how deeply entrenched gender norms within a community affect VAW in public place, we adopt a novel approach. We leverage an Indian festivity where certain unwanted behaviors towards strangers are widely condoned and use this context as a natural social experiment. This temporary decrease in the social consequences of harassing

¹In the UK, one in three women attending music festivals have experienced sexual assault or harassment. <https://journals.sagepub.com/doi/full/10.1177/10778012221120443>.

²Oxfam highlights ten harmful social norms that drive violence against women and girls. The ‘Enough campaign’ aims to challenge these widely accepted and harmful social norms that frequently rationalize violence against women and girls. See [here](#) for the list of harmful social norms.

³For instance, traditional theories for studying domestic violence (e.g., within household bargaining power) do not apply to VAW in public places. Likewise, as the perpetrator and victim are not acquaintances or partners, there is no spiral of violence between them. Note that, given that most of the gender-based violence is committed by men against women, we refer to men as perpetrators and women as victims.

strangers enables some men (perpetrators) to act by their true nature and underlying attitudes towards women.⁴ Moreover, we separately analyze how men’s and women’s perceptions of VAW impact the prevalence of these incidents during the festivity.

This study examines VAW in public spaces during Holi celebrations, arguably the most popular festival in India. As the most populous country in the world and its deeply entrenched patriarchal norms, India offers an interesting setting for this analysis. Gender inequality is widespread, with men typically holding dominant positions in both households and society. India has also gained notoriety as one of the most dangerous countries for women, with four rape cases reported every hour ([Thomson Reuters Foundation](#)).

Holi, celebrated in India, Nepal, and countries with large Indian diasporas like the United Kingdom or the United States, attracts large crowds. However, these celebrations have been tainted by longstanding issues of violence and harassment. The festival’s atmosphere often normalizes behaviors like touching, throwing colored powder, and splashing water at strangers. Women are disproportionately affected, and a common Hindi phrase, “Bura na mano Holi Hai” (Don’t feel offended, it’s Holi), is sometimes used to justify misconduct. Media reports have highlighted incidents of harassment during Holi festivities, drawing attention to the issue ([BBC News](#), [The Washington Post](#)). In 2023, global focus turned to the case of a 22-year-old Japanese woman who was harassed on the streets of New Delhi by a group of men who forcibly smeared colors, cracked an egg on her head, and groped her ([Economic Times](#)). This paper quantifies and causality estimates the extent to which Holi promotes VAW during the festivities and what are the underlying reasons for it.

We focus on Holi’s impact on VAW in the state of Bihar, known for its entrenched patriarchal norms. Moreover, Bihar offers an interesting setting as alcohol production, sale, and consumption have been legally prohibited since 2016. Alcohol consumption is a significant contributor to sexual misconduct ([Luca et al., 2015](#)), especially during social gatherings and parties (see [Lindo et al., 2018](#) [Khurana and Mahajan, 2022](#)). In our context, alcohol consumption is not a significant factor driving VAW.⁵

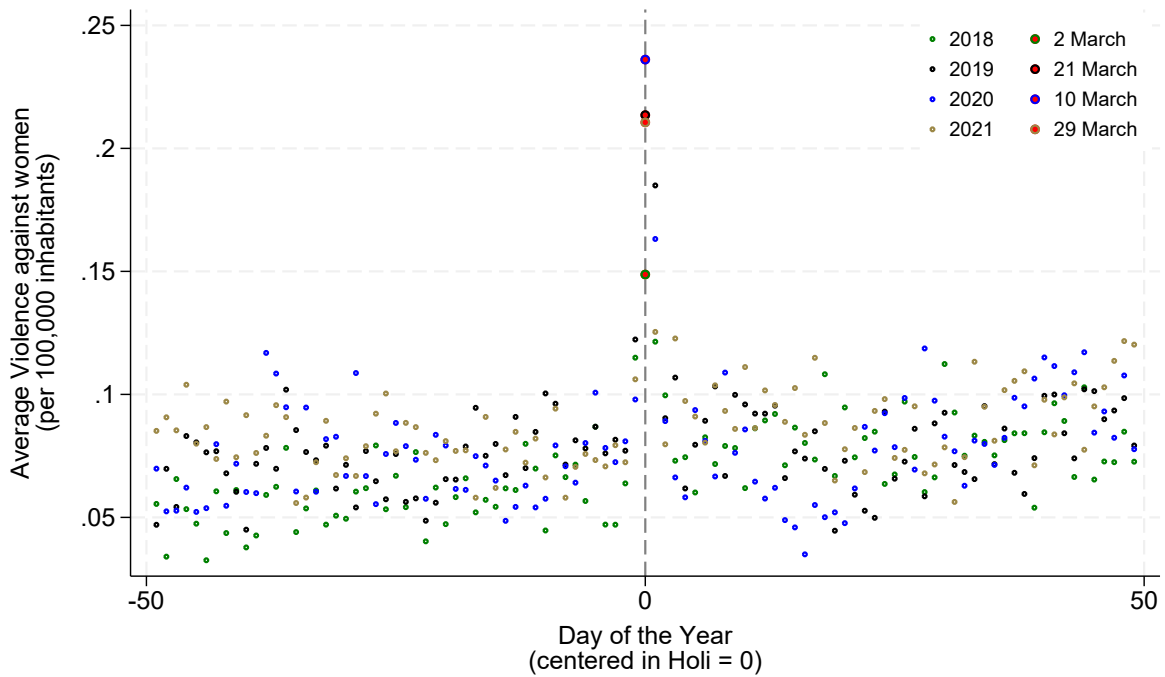
We use data from individual police reports to investigate if there is a notable difference in criminal incidents against women during Holi. Using incident date (not the date when the offense is reported), we obtain the daily number of assaults against women, sexual violence against women, and an aggregate measure of VAW in each district. [Figure 1](#) shows our aggregate measure of VAW in Bihar for dates around the Holi celebrations for the years 2018-2021. From the raw data, we can observe a stark surge in offenses against women during Holi.

To estimate the causal impact of Holi on VAW, we use the fact that Holi follows the lunar calendar, allowing us to exploit the various dates of the event. For instance, in 2018, Holi fell on Friday the 2nd of March, while in 2019 it fell on Thursday the 21st of March (see [Figure 1](#)). In this sense, our identification strategy compares VAW in otherwise similar days whose treatment status differs due to the use of the

⁴This relates to the literature on signalling models where agents have social-image concerns, whereby there are two types of men: good and bad, and their actions reveal something about their type. In these models, bad-men wants to be perceived as good and therefore adjust their behavior to be ‘pooled’ with good-men. The exogenous reduction in the social cost of unwanted behavior produced by the festivity incentives a share of bad-men to behave according to their type and, thus, increasing VAW in public spaces. See [Bénabou and Tirole \(2006\)](#); [Bursztyl and Jensen \(2017\)](#) for signalling models with agents with social image concerns, and [Sharma \(2021\)](#) for an application to sexual harassment.

⁵Regardless of this, we analyze whether alcohol consumption plays a role in explaining VAW (see [section C.1](#) in Online Appendix). We do not find evidence suggesting this.

Figure 1: Daily Crimes Against Women by year around Holi



Notes: This figure shows the daily number of crimes against women in Bihar for dates around Holi and different years. The dates are normalized such that Holi is at a date equal '0'. For 2018, there is no data for two districts out of the 38.

lunar calendar for establishing the Holi festivities. We include a large set of flexible temporal controls. Furthermore, given that Holi is a Hindu festival, we use Muslim-majority districts as a counterfactual to strengthen our identification strategy ever more by accounting for any potential aggregate factors that might occur during date of the festivity.

We find a substantial increase in assaults against women of over 170% during Holi compared to otherwise similar days. Similarly, sexual violence and our aggregate variable of VAW during Holi increase in over 160% and 140%, respectively. Additionally, using an event-study analysis, we show that the rise in violence lasts for three days.⁶ These effects are quite large, and recognizing that underreporting of criminal cases against women is generally present, our estimates represent a lower bound. Furthermore, we find no significant impact of Holi on VAW in predominantly Muslim districts, as Holi is a Hindu festivity. Moreover, we do not find a systematic increase in VAW during other holidays and large festivities in Bihar. This suggests that the surge in violence during Holi cannot be solely attributed to public celebrations; rather, we argue it is driven by deeply ingrained gender norms.

To further explore how gender norms impact VAW in public places, we use survey data related to attitudes towards VAW. Specifically, we analyze separately how perpetrators' and victims' gender norms impact VAW during Holi. Additionally, we explore how these gender norms impact women's decision to participate in Holi, and on their reporting behavior regarding cases against them.

We find two distinct effects. First, an intensification effect, where VAW is higher in places where men believe that it is justified to hit women. In this sense, Holi exacerbates existing underlying attitudes,

⁶We analyze whether Holi also impacts assaults against men. In contrast with assault against women, we do not find any impact on assault against men. This result could reflect the significant unbalance of power across genders in India.

and beliefs that justify men’s behavior towards women. Second, we find that VAW is higher in districts where women believe that wife beating is inappropriate. This result suggest the presence of a male backlash effect (or retaliation effect), where men engage in more VAW in response to an increase in female empowerment.

Finally, we explore the role of gender norms on (i) underreporting of offenses, and (ii) women’s mobility during Holi as a potential explanation of the second result. Women in male-dominated areas may stay home during Holi to avoid harassment, potentially reducing VAW by limiting opportunities for perpetrators to find victims. Additionally, underreporting may be higher where VAW is seen as justifiable. Even if women participate in Holi, they might not report violence. We find no evidence that these mechanisms are the main drivers of the second effect.

Our research uncovers evidence of the role of gender norms during Holi, where harassment is frequently socially accepted, on violence against women. These celebrations exacerbate existing gender norms, leading men to feel even more entitled to engage in such behavior. Overall, violence against women and sexual misconduct appears to be a manifestation of a broader societal issue, not exclusively linked to alcohol consumption.

1.1 Literature and Contribution

This study contributes to two areas of literature. Firstly, it contributes to the crescent literature analyzing violence against women. While prior research has predominantly focused on violence taking place within the household, this study shifts the focus to VAW in public spaces. Even though surveys indicate that public spaces are among the most prevalent locations where women experience violence ([Harassment, 2018](#)), and that such acts considerably differ from offenses committed in private dwellings, little academic research analyzes this issue. Our paper adds to this body of literature by studying this so-far overlooked form of gender-based violence: public violence against women.

Recent literature studying VAW in public spaces has examined social gatherings and events that intensify partying and their potential repercussions for sexual assault. For example, [Lindo et al. \(2018\)](#) demonstrate that football games, which heighten partying among college students, lead to an increase in rape incidents in the United States. They find that a key contributing factor to such behavior is alcohol consumption, which has been identified as a significant catalyst for victimization in general ([Bindler et al., 2021](#)). In turn, [Amaral et al. \(2023\)](#) study street sexual harassment in Hyderabad, India, and the impact of a formal institution: police street presence. They find that higher police presence decreases severe forms of harassment but not mild offences. This is attributed to police officers exhibiting higher tolerance towards less severe forms of harassment. Also, related to harassment in public spaces, [Aguilar et al. \(2021\)](#) and [Kondylis et al. \(2020\)](#) analyze the role of women-only-cars in the subways in Mexico City and Rio de Janeiro, respectively. Both studies find that offering women-only cars in public transportation reduces harassment while commuting. While these types of policies are effective in reducing harassment against women on a daily basis, they do not tackle the underlying reason for this overwhelming abuse against women. Our paper stresses the importance of addressing underlying attitudes towards VAW.

Our study advances this literature on different fronts. Particularly, we analyze different types of VAW in public spaces: assaults, sexual violence (including sexual harassment, voyeurism, and stalking, among

others), and an aggregate measure of public VAW. There is little to no research done on these serious offenses. Furthermore, our study examines a context where strict laws regulate alcohol, suggesting that alcohol consumption is not the main trigger for these offenses. This allows us to somewhat isolate this common factor in VAW (Luca et al., 2015; Lindo et al., 2018; Khurana and Mahajan, 2022).

More importantly, our paper pushes forward the crucial role of gender norms in perpetuating VAW in public places. A few previous studies have linked social norms and VAW, but focusing on domestic violence (González and Rodríguez-Planas, 2020; Alesina et al., 2021; Tur-Prats, 2019). These studies find evidence that norms correlate with domestic violence, yet they differ in the settings and how they measure norms. Alesina et al. (2021) use cross-country data for Africa to show that pre-colonial factors by ethnic group correlate with current gender norms and incidence of domestic violence. González and Rodríguez-Planas (2020) study how gender norms of the ancestry of first and second-generation immigrant women impact their odds of being victims of domestic violence using survey data for 12 European countries. Tur-Prats (2019) uses data from Spain to study how traditional family structure causally impacts domestic violence, using medieval inheritance laws as an instrument.⁷ More recently, Guarnieri and Tur-Prats (2023) show how gender norms impact conflict-related sexual violence. They find that soldiers adhering to male-dominant norms are more likely to perpetrate sexual violence against war victims compared to those endorsing more gender-equal norms.

Instead, our paper studies the role of underlying societal gender norms on public VAW using a major religious festivity that draws millions of individuals worldwide, the Hindu celebration of Holi.⁸ Our paper exploits a temporal reduction in the social cost of harassing strangers in the streets during Holi. Given this lower social cost of unwanted behavior, certain types of men will misbehave during Holi celebrations.

This change in perpetrators' behavior based on social image concerns relates to a growing literature in economics, which explores how beliefs about gender roles influence women's outcomes. Recent policy efforts have focused on modifying harmful gender-biased social norms and beliefs, and numerous studies have explored how reshaping these norms can improve women's social standing (e.g., Bursztyl et al., 2020, 2023; Bandiera et al., 2020; Dhar et al., 2022; Edmonds et al., 2023). One paper that studies sexual harassment and gender-based beliefs is Sharma (2021). The intervention aimed at raising awareness about harassment among male and female students within an educational institution in India seems to decrease future harassment. In a similar vein, results from Amaral et al. (2023) suggest that training programs aimed at altering the police's attitude towards sexual misconduct could effectively address sexual harassment in public spaces.

A key distinguishing aspect of our paper is that, rather than focusing on providing information to individuals and attempting to change beliefs, in our setting perpetrators expect a lower social cost for misbehaving and adapt their behaviour accordingly. Our setting allows us to analyze separately the role of men's (perpetrator) versus women's (victim) beliefs about VAW on public VAW. Furthermore, we analyze how these gender norms affect reporting behavior, which is not commonly analyzed in papers

⁷Tur-Prats (2019) compares stem families -where different generations co-habit together- versus nuclear families -where there is no intergenerational cohabitation. The idea is that co-residence with the mother-in-law allows the wife to contribute more to farm work and hence, reduces the level of VAW.

⁸In this sense, our paper also relates with literature analyzing the impact of religious festivities on different socio-economic outcomes (e.g., Catholic festivals in Mexico on economic development (Montero and Yang, 2022), Muslim's Ramadan festival on growth (Campante and Yanagizawa-Drott, 2015)).

studying VAW. Also, our paper sheds light on how women’s mobility decisions depend on the potential risk of harassment given the underlying gender norms (Borker, 2021; Aguilar et al., 2021; Kondylis et al., 2020).

2 Background and Data

Holi, the festival of colors, is an ancient Hindu celebration welcoming spring and symbolizing a fresh start. The festivities occur on the last full moon day in the lunar month of March. During Holi, it is believed that gods turn a blind eye, allowing Hindus to let loose, dance, party, and temporarily set aside cultural norms.

We analyze Bihar, India’s third-largest state with over 120 million people (similar to Japan or Mexico). Bihar has entrenched patriarchal norms, one of the lowest female literacy rates, female labor participation in India. In Bihar, Holi holds significant cultural importance among all festivities. It extends over two days. On the evening the full moon day, people light up a pyre and discard old possessions into the fire, signifying the removal of past troubles and negative energies. The next morning, the carnival begins with people smearing each other with vibrant colors, water play, water balloons, and traditional folk songs. Throughout the celebrations, a common phrase is often heard: ‘Bura na mano Holi Hai’, which means ‘Don’t feel offended, it’s Holi’.⁹ This phrase has been utilized to justify behaviors such as throwing colored powder, touching, and splashing water at strangers, with women disproportionately affected and often victims of an unbalanced power dynamic. Certain men, in particular, may feel inclined to behave inappropriately towards women and exploit this phrase to rationalize such conduct.

2.1 Data

We use criminal case information from the police’s First Information Reports (FIRs), which are written documents prepared by the police in India upon the reporting of a crime. The data covers the period from 2018 to 2021 and is made available through the Bihar Police Department. The reports include crucial information about the incident, including the date of occurrence and date of reporting, and associated criminal charges, which we use to identify crimes against women. Criminal cases can be reported either at the police station or through online registration through a smartphone application.

It is important to note that throughout our analysis we classify incidents according to the actual date of the incident and not the date of reporting. This is relevant as some criminal incidents might be reported on a different day due to the Holi festivities. Additionally, we use the delay in reporting (i.e., the number of days between the incident and the reporting) to analyze reporting behavior across criminal offenses. This is particularly important as offenses against women are commonly underreported. Section 6 discusses in detail reporting behavior and whether this was affected by the Holi celebrations.

We analyze three outcome variables: assaults against women, sexual violence against women, and an aggregate measure of VAW. The main variable of analysis focuses on offenses where women are victims of assaults or criminal force, the most common offense against women in India. In turn, sexual violence

⁹Numerous popular songs feature this phrase in their lyrics, with an example being a song titled ‘Bura na mano Holi Hai’.

against women includes sexual harassment, acts with the intent to disrobe a woman, voyeurism and stalking. Our aggregate variable of VAW accounts for assaults and sexual violence against women, and also includes insults against women and kidnapping. Table B.1 in the online Appendix provides details on the exact criminal offenses included in each variable according to the Indian Penal code.

Table 1 provides the main statistics regarding the criminal cases separated by dates during Holi and non-Holi days. The reports confirm that public assaults are the most common offense against women in India. There are 0.045 assaults against women per district each day, with a maximum of 0.786 within a day in a district. Regarding cases of sexual violence against women there are 0.031 cases per district-day per 100,000 inhabitants. Our aggregate measure of VAW shows that, on average, there are over 0.082 incidents of VAW per day in districts in Bihar per 100,000 inhabitants. All of these offenses almost triple during Holi celebrations as shown in Table 1.

Table 1: Summary statistics - Daily crimes against women per district (per 100,000 inhabitants)

	Non-Holi			Holi		
	mean	sd	max	mean	sd	max
Assault against women	0.045	(0.055)	0.786	0.115	(0.110)	0.786
Sexual violence against women	0.031	(0.047)	0.599	0.078	(0.084)	0.471
Violence against women	0.088	(0.081)	1.172	0.203	(0.147)	0.786
Observations	50565			150		

Notes: This table shows average daily crimes per 100,000 inhabitants (standard deviation, and maximum) at the district level for different crime categories based on first information reports in Bihar. Sexual violence against women includes sexual harassment, acts with the intent to disrobe a women, voyeurism and stalking. Violence against women includes assaults, sexual violence and, insults against a woman and detaining a married woman with a criminal intent. Holi is defined here only for the exact date of the festival of colours.

3 Empirical Strategy

Analyzing the causal impact of underlying gender norms on VAW in public places is challenging as norms cannot be randomly distributed across society. To overcome this, we follow a novel approach by studying an Indian festivity where certain unwanted behaviors towards strangers are widely condoned and use this context as a natural social experiment. Given the reduced social cost towards unwanted behavior during the holidays, some men will behave according to their true underlying perceptions about women.

Our identification strategy leverages the fact that Holi is celebrated on the last full moon day of the lunar month. This implies that the exact date of Holi varies from year to year.¹⁰ To obtain the causal impact of Holi on VAW we estimate the following equation:

$$\text{VAW}_{dymt} = \alpha + \beta \cdot \text{Holi}_{ymt} + \eta_y + \delta_m + \omega_t + \text{dow}_t + \mu_d + \epsilon_{dymt}, \quad (1)$$

where VAW_{dymt} is the number of crimes against women per 100,000 inhabitants of district d in year y ,

¹⁰For instance, in 2018, Holi fell on Friday the 2nd of March, while in 2019 it fell on Thursday the 21st of March.

month m , and day t . Each observation is at the district-day level. $Holi_{ymt}$ is a binary variable that equals one if the day of observation is during the festival of colours. To account for any seasonality and possible time trends regarding VAW, we control for year fixed effects (η_y), month fixed effects (δ_m), and day of the month fixed effects (ω_t). We also include day-of-the-week fixed effects (dow_t) to account for the fact that VAW can vary across days of the week (e.g., weekdays versus weekends) and we add district fixed effects (μ_d) to control for time-invariant differences across district (e.g., controls for the size and overall characteristics of the population). The standard errors are clustered at the district level.

Furthermore, given that Holi is a Hindu festivity, we can use Muslim-majority districts as a counterfactual to strengthen our identification strategy ever more by accounting for any potential aggregate factors that might occur during the date of the festivity. Hence, we expand Equation 1 as follows:

$$VAW_{dymt} = \alpha + \beta_1 \cdot Holi_{ymt} + \beta_2 \cdot Holi_{ymt} \times Muslim_d + \eta_y + \delta_m + \omega_t + dow_t + \mu_d + \epsilon_{dymt}, \quad (2)$$

where $Muslim_d$ is a dummy variable equal to one if the majority of the population in the district is Muslim.¹¹

Finally, as Holi celebrations occur during a few days and an increase in VAW could generate more VAW in the following days, we analyze the dynamic impact of Holi on VAW by estimating the following event study:

$$VAW_{dymt} = \alpha + \sum_{k=-T}^{-2} \phi_k \cdot day_t + \sum_{k=0}^{\tau} \phi_k \cdot day_t + \eta_y + \delta_m + \epsilon_{dymt}, \quad (3)$$

where day_t is a dummy variable taking the value of one for different days and the start of Holi is denoted by $t = 0$. The parameters $\{\phi_k\}_{k=0,1,2,\dots,\tau}$ capture the dynamic impact of the Holi on VAW having as baseline the day before the first part of the Holi celebration denoted by $t = -1$. Hence, in this specification the day where the festival of colours occur is $t = 1$.

4 The Impact of Holi on Violence Against Women.

The first three columns of Table 2 shows the results from estimating Equation 1. Column (1) shows the impact of Holi celebrations on assault against women. We observe a large significant impact of Holi on assaults implying an increase of over 170% during the celebrations. Column (2) illustrates a similar pattern for sexual VAW, demonstrating a surge of over 160% during the Holi. The results of our aggregate measure of VAW, displayed in column (3) show a large increase of Holi on VAW, of over 140%.

The last three columns of Table 2 show the results from estimating Equation 2 using predominantly Muslim districts as counterfactual. This is because the intensity of festivities, particularly in Muslim neighborhoods, is significantly lower since Holi is a Hindu festival. As can be seen in columns (4) to (6), when adding Muslim-districts as an additional control, the impact of Holi on our three measures for VAW are almost the same as in the first three columns, providing additional confidence on our estimations.¹²

¹¹Note that we do not include the $Muslim_d$ as an additional variable (only the interaction with Holi) in the Equation 2 as this is already captured by the district fixed effects.

¹²The impact of Holi on any of our three outcome variables is not significant in Muslim-majority districts. There is one district in Bihar (Kishanganj) where Muslims are the majority (see Figure A.2). When we include the districts with nearly 40% of Muslim population, the results do not differ.

Table 2: Impact of Holi on Violence Against Women

	Holi Festival			Holi Festival and Muslim majority district		
	(1) Assaults Against Women	(2) Sexual Violence Against Women	(3) Violence Against Women	(4) Assaults Against Women	(5) Sexual Violence Against Women	(6) Violence Against Women
Holi	0.078*** (0.011)	0.050*** (0.009)	0.125*** (0.016)	0.079*** (0.011)	0.051*** (0.009)	0.127*** (0.016)
Holi × Muslim				-0.054*** (0.011)	-0.039*** (0.009)	-0.087*** (0.017)
Observations	50,715	50,715	50,715	50,715	50,715	50,715
Dep. Var. Mean	0.045	0.031	0.088	0.045	0.031	0.088
Proportion	1.724	1.624	1.418	1.756	1.657	1.445
Day of the Week FE	✓	✓	✓	✓	✓	✓
Month FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Day of the Month FE	✓	✓	✓	✓	✓	✓

Notes: This table shows the estimates from Equation 1 for different types of violence against women and districts. Holi is a dummy variable equal to 1 during the festival of colours and zero otherwise. Muslim districts contain districts where the majority of the population is Muslim and where Holi, being a Hindu festival, is not widely celebrated. Observations are daily at the district level. All regressions include day-of-the-week fixed effects, month fixed effects, year fixed effects, day of the month fixed effects. Parentheses show clustered standard errors that are robust within districts.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 2 shows the dynamic impact of Holi on our three variables for VAW. Figure 2 (a) shows a large increase in assaults against women during Holi, particularly during the festival of colours ($t = 1$). However, assaults increase slightly during the first day of the festivities (before the festival of colours). Also, we observe a significant increase in assaults even after the festival of colors, but lasting only one day after Holi. After these days, assaults against women return to the pre-Holi levels.¹³ Figure 2 (b) shows similar pattern for sexual crimes against women. There is a large increase in sexual VAW mainly during the festival of colours. The effect however is short-lived. Figure 2 (c) shows the dynamic impact of Holi on our aggregate variable for VAW. As before, there larger impact occurs during the festival of colours, yet there is an increase the day before and the day after as well.¹⁴

4.1 Do other Festivities Increase Violence Against Women?

The rise in VAW during Holi could stem from the crowded streets, facilitating sexual harassment and public disturbances. Additionally, Bihar’s limited police capacity might contribute to the surge, as they struggle to address criminal offenses during large events.

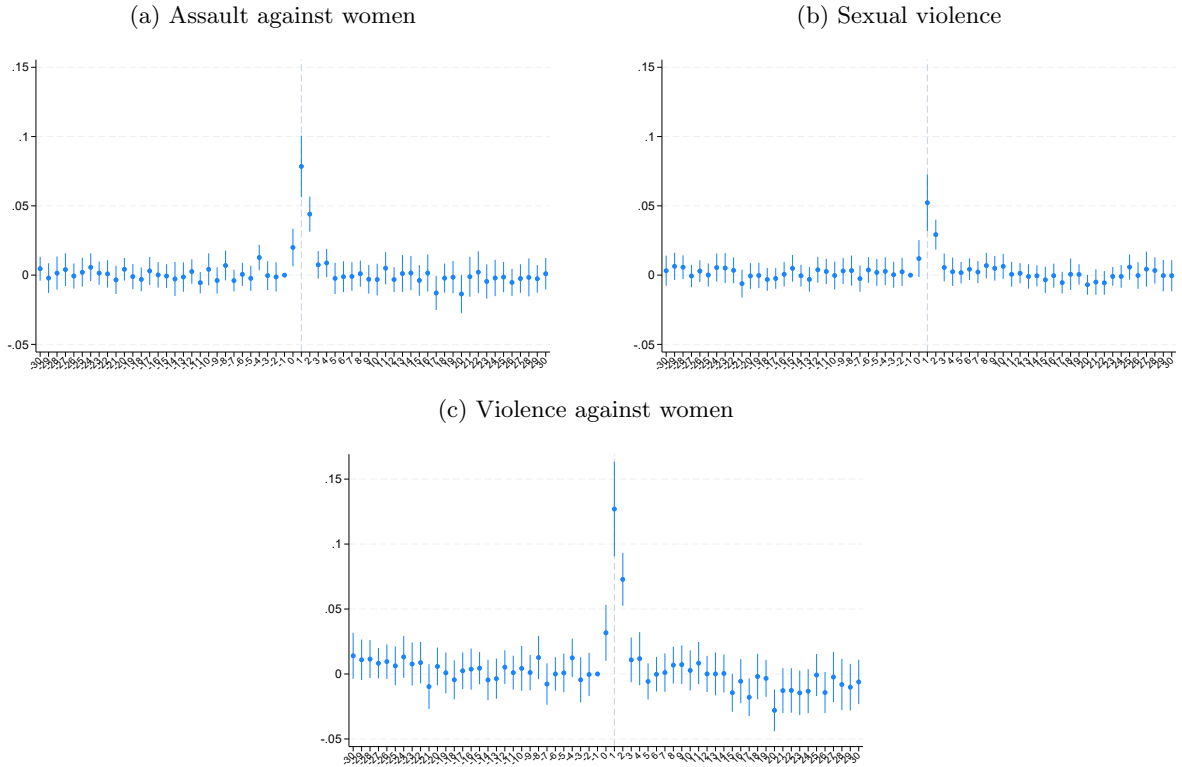
Before delving into the impact of gender norms on the rise in VAW during Holi, we examine if this surge is exclusive to Holi or applies to other Indian festivities. We study Chhath Puja, the largest Hindu celebration in Bihar, the famous Hindu celebration of Diwali, and other well-known festivities such as New Year’s Day, and Independence Day.

Table A.2 in Online Appendix shows that most festivities do not increase VAW. We only find a

¹³Table A.1 in the Online Appendix shows the point estimates for each day associated with the event study in Figure 2.

¹⁴We do not observe any impact of Holi on assaults against men (see Figure A.3 (a) in Appendix), although underreporting could be an issue regarding this crime. We study assaults against public servants, which is less likely to be underreported. Figure A.3 (b) shows a small yet significant increase in assaults against public servants during the Holi. This impact only occurs during the festival of colors, which contrasts with the large three-day impact on women.

Figure 2: Event-study plots of the impact of Holi on violence against women



Notes: This figure plots the coefficient $\{\phi_k\}$ from Equation 3 for each dependent variable. The figure shows 95% confidence intervals. Vertical line denotes the celebration of the festival of colours, Holi ($t = 1$).

significant increase in VAW during Diwali. However, the effects are substantially smaller in magnitude (an 10% increase in aggregate VAW) compared to those produced during Holi (a 140% increase in aggregate VAW). Chhath Puja, New Year, and Independence Day in Bihar do not show a rise in VAW. This indicates that the factors behind the increase during Holi are not linked to common elements found in major events, like large crowds or limited police resources.

5 The Role of Social Norms in Perpetuating Violence Against Women

This section explores the role of social norms in perpetuating VAW, focusing on how attitudes towards violence from men's (i.e., perpetrator) perspective and women's (i.e., victim) perspective sustain it.

Sexual assaults are mostly opportunistic and expressive in the sense that they satisfy the perpetrator's private motivations (e.g., sexual desire or wish for dominance over the victim). Some public festivities may create a suitable scenario for such acts to occur since certain misbehaviors are more likely to be condoned during the celebrations. Some men may feel entitled to behave differently towards women during Holi celebrations, triggered by harmful sentiments against women.

Gender norms of both the perpetrator and the victim play a crucial role in explaining sexual violence. On one hand, in communities with strong male dominance, perpetrators may face fewer consequences for committing sexual violence. On the other hand, men may see greater benefits in assaulting women

who support gender equality, perceiving their status as a threat to traditional beliefs and norms. Some men may take greater pleasure in assaulting women who resist or speak out, and the festive atmosphere of Holi allows them to do so without facing significant social consequences.

To study these potential effects we analyze whether the impact of Holi varies across districts with different norms concerning violence against women. For our main analysis, we use information from the National Family Health Survey (NFHS-4) related to views on whether it is justified to beat women.¹⁵ We analyze how gender norms impact VAW by exploring the survey's answers from women and men separately. This allows us to analyze the norms from the men's point of view (i.e., perpetrator) and from the women's point of view (i.e., victim).

Interestingly, in the majority of the districts in Bihar, more women than men agree that a husband is justified in beating his wife (see Figure A.4 in Online Appendix). On average, 54% of women versus 37% men believe that this behavior is justified. Yet, there are some districts where a higher share of men than women believe that wife beating is justified (see districts below the 45-degree line in Figure A.4).

Table 3 shows the results based on wife beating perception separated by gender. First, we analyze how preexisting attitudes towards VAW from the perpetrator's perspective (i.e., men) impact VAW during Holi. Then, we analyze how preexisting attitudes towards VAW from victim's perspective (i.e., women) impact VAW during Holi.

Overall, there seem to be two different effects in Table 3. First, there is an intensification effect, where VAW during Holi is higher in places where men believe that it is justified to hit women. This is true for our three different measures of VAW (see columns (1)-(2) for assaults, columns (3)-(4) for sexual violence, and columns (5)-(6) for our aggregate measure for VAW). On the one hand, places where perpetrators believe that VAW is justified have a larger number of assaults against women (0.050), sexual violence (0.032) and VAW (0.094) compared to places where VAW is less justified (0.040 assaults, 0.030 sexual violence, and 0.082 VAW). On the other hand, while the impact of Holi is positive and significant for our three VAW measures across places with different men's attitudes towards VAW, its impact (point estimates and in proportion) is relatively larger when perpetrators believe that VAW is justified. Particularly, in places where men justify VAW, there is nearly 40 to 50 percentage point more VAW (across our three measures) than in places where men are less likely to justify VAW. Overall, the results from Columns (1)-(6) show that the perpetrator's gender norms matter for different forms of VAW. This relates to the fact that in contexts where men justify VAW, they face lower costs of exerting VAW. In these contexts, Holi provides an opportunity for perpetrators to commit a large number of offenses against women.

Second, Table 3 columns (7)-(12) suggest the presence of a male backlash effect (or retaliation effect), where VAW is higher in places where women believe that it is not justified for men to hit women. The impact of Holi is positive and significant for our three VAW measures across places with different victim's attitudes towards VAW. However, the point estimates and relative impacts are larger when women believe that VAW is not justified. For the case of assaults, they increase by 200 percent during Holi on places where women do not justify VAW, whereas the increase is 130 in places where women

¹⁵The survey asks men and women whether they believe a husband is justified in hitting or beating his wife under specific circumstances, including if she burns the food, argues with him, goes out without informing him, neglects the children, or refuses sexual relations.

justify VAW. These differences are large and significant. Similar things occur for sexual violence and our aggregate measure of VAW. Overall, Columns (7)-(12) show that not only perpetrators’ gender norms matter for VAW, but also victims’ perceptions. This could relate to the notion that the perceived benefits of sexually assaulting women are higher when the victim holds more gender-equal norms.

Another potential explanation for this second effect is that women in male-dominated places (i.e., where women believe that VAW is justified) may choose to stay at home to avoid potential harassment. This can lead to lower crime levels in such areas due to reduced opportunities for perpetrators to find suitable female victims. Moreover, underreporting of incidents could be more prevalent in such areas, as women may justify VAW, leading to fewer reported incidents even if they participate in Holi festivities.

The reduced VAW in districts where women justify it compared to those where they don’t could be explained by: (i) a male backlash effect, (ii) severe underreporting during Holi in more patriarchal places, and/or (iii) fewer women playing Holi in more patriarchal places. It’s possible that all three mechanisms are at play simultaneously. We analyze these two potential mechanisms in Section 6.¹⁶

Table 3: Impact of Holi on Violence Against Women by Attitudes Towards Wife Beating from Perpetrator’s and Victim’s Perception

	Men/Perpetrator’s Attitudes towards VAW						Women/Victim’s Attitudes towards VAW					
	Assaults Against Women		Sexual Violence Against Women		Violence Against Women		Assaults Against Women		Sexual Violence Against Women		Violence Against Women	
	(1) Less Justified	(2) More Justified	(3) Less Justified	(4) More Justified	(5) Less Justified	(6) More Justified	(7) Less Justified	(8) More Justified	(9) Less Justified	(10) More Justified	(11) Less Justified	(12) More Justified
Holi	0.059*** (0.011)	0.096*** (0.017)	0.043*** (0.012)	0.058*** (0.013)	0.101*** (0.018)	0.149*** (0.026)	0.095*** (0.012)	0.058*** (0.018)	0.059*** (0.012)	0.041*** (0.013)	0.149*** (0.022)	0.099*** (0.024)
Observations	22,781	26,585	22,781	26,585	22,781	26,585	28,178	21,188	28,178	21,188	28,178	21,188
Dep. Var. Mean	0.040	0.050	0.030	0.032	0.083	0.094	0.046	0.044	0.031	0.032	0.090	0.087
Proportion	1.477	1.919	1.439	1.820	1.216	1.590	2.070	1.312	1.916	1.272	1.653	1.136
Share justifying VAW	0.269	0.455	0.269	0.455	0.269	0.455	0.484	0.605	0.484	0.605	0.484	0.605
Adjusted R ²	0.072	0.082	0.219	0.148	0.136	0.144	0.082	0.089	0.143	0.222	0.122	0.166

Notes: This table shows the estimates from Equation 1 for different districts depending on their attitudes towards wife-beating (for men and women, separately). We exclude districts with Muslim majorities. All regressions include day-of-the-week fixed effects, month fixed effects, year fixed effects, day of the month fixed effects. Parentheses show clustered standard errors that are robust within districts.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6 Impact of Gender Norms on Underreporting and Women’s Mobility

This section examines if increased underreporting or more women staying home during Holi could explain some findings from Section 5, especially regarding the lower VAW in districts where women justify wife beating compared to those where they don’t. (see Table 3, columns (7)-(12)).

Patriarchal societies might (i) discourage the reporting of crimes against women, and/or (ii) constrain women’s mobility. These two behaviors could be exacerbated during Holi. Victims of assault during Holi may hesitate to report incidents, fearing that police might dismiss them as part of the festive tradition

¹⁶Note, that (i) underreporting and (ii) low women’s participation in Holi cannot explain the results of columns (1)-(6) in Table 3 regarding an intensification effect. Arguably, underreporting might be larger in districts where VAW is more justifiable (if any). If so, the differential effects found across places that justify and not VAW in columns (1) to (6) should be even larger.

or even blame the victim for participating. Additionally, women might be less likely to leave the house during Holi, particularly in more patriarchal places as they expect more VAW during the festivities.

This section starts by discussing the presence of potential underreporting and then women’s mobility during Holi. It’s crucial to emphasize that if either of these two effects is present, it does not diminish the significance of gender norms in explaining the surge in VAW (see Table 2). Quite the contrary, as these two other mechanisms are also driven by gender norms. However, the interpretation of some of the results might differ.

6.1 Gender Norms and Underreporting of Crimes Against Women

Underreporting is common in crimes against women, especially where behaviors like sexual harassment are socially normalized. Thus, it is plausible that women in highly patriarchal societies might hesitate to report instances of sexual abuse or other form of VAW. This could be due to police inaction or even because women themselves believe that they deserve to be mistreated (see Figure A.1). Regardless of the underlying reason for underreporting, if this occurs at higher rates in more patriarchal places this implies that (i) the intensification effect found earlier (see Columns (1)-(6) in Table 3) could be even larger, and (ii) that this underreporting might contribute to the lower VAW observed in districts where women justified VAW compared to those where women don’t justify it.

To analyze reporting behavior we use data on the number of days between the date of the incident and the reporting date (Poblete-Cazenave, 2024). While this information is only available for cases that ultimately were reported, it does reveal information about the victim’s reporting behavior as it shows how long it took the victim to report the case.¹⁷

Table A.3 shows summary statistics for the reporting delay for different crimes. On average, female victims take just over seven days to report assaults and sexual violence. The reporting delay is slightly higher at 8.7 days when analyzing our aggregate variable of VAW.

Interestingly, Table A.3 in Online Appendix shows that conditional on reporting a case, women take more time to report cases than men.¹⁸

Table A.4 in Online Appendix analyses whether Holi affects reporting behavior and whether there are differential impacts by women’s attitudes towards VAW for several types of criminal cases. First, we observe that, on average, offenses occurring during Holi are reported with higher delay than those occurring any other day. This delay is statistically significant and amounts of one extra day for assaults and two days for sexual violence against women (see Columns (1) and (3)), and six days for assaults against men (see Column (7)). This shows that victim’s reporting behavior is affected by Holi. Yet, as expected, public servants reporting behavior is not affected by Holi (see Column (9)).

Second, we do not observe clear significant differences in reporting behavior during Holi across districts with different levels of women’s attitudes towards VAW. While there seems to be a larger delay in reporting cases in places where a larger share of women believe that is justifiable to hit women (see

¹⁷The majority of the reported cases against women are done by the victim.

¹⁸There are various reasons for this, such as perceptions of the police and judicial system, feelings of shame, time constraints, and remote work. We remain neutral on this matter. This is also evident when examining reporting delays for assaults against public servants, which are less affected by underreporting. The reporting delay for assaults against public servants is significantly shorter, whether against women (three days) or men (two days). This suggests these cases are less likely to be underreported, adding confidence to the reliability of this measure for analyzing reporting behavior.

interaction term in columns (2), (4) and (6)), these differences are not significant at conventional levels of significance for assaults and sexual violence. Yet, for our aggregate variable of VAW we observe a differential impact of Holi by women’s attitude towards VAW. Interestingly, men’s attitudes towards VAW does not have any impact on reporting delay for offenses against women (see interaction term in columns (2), (4) and (6) for men’s attitudes). The magnitude of the estimates is small and not significant.

Overall, the results of Table A.4 suggest that underreporting is not the main driver of the higher VAW found in district where women justify VAW compared to those that do not (see Table 3). Note, however, this analysis is suggestive as we analyze reporting behavior using the delay in reporting for cases actually reported.

6.2 Gender Norms and Women’s Presence in Public Spaces

In patriarchal societies, women face restrictions on their mobility, needing approval from the family head (husband or father) or limiting themselves due to safety concerns. Hence, in districts where VAW is accepted, women likely have even less freedom of movement compared to areas where it’s less tolerated.

In highly patriarchal areas, women may refrain from participating in Holi due to restrictions or fear of abuse. Conversely, in districts with less tolerance for VAW, women may feel more empowered to join Holi celebrations, as they seek to assert their right to participate in the celebrations and claim public spaces, while weighting the risk of harassment. Ultimately, women mobility impacts the prevalence of VAW during Holi as the availability of potential victims to be assaulted during the celebration depends on the underlying norms about VAW. This can partially explain the higher VAW observed in districts where women do not justify wife beating compared to those where women justify it (see Table 3).

Studying these changes in female mobility during Holi is challenging as this requires access to daily data on mobility across districts during Holi and by gender. Such information does not exist. However, we address this challenge by combining data from various sources. We use information from Google mobility index (GMI), which uses mobile phone data to track the amount of individuals in a certain location. We focus on GMI data related to time spent at private residences and visits to grocery stores and pharmacies, as women in patriarchal areas like Bihar are more likely to handle grocery shopping compared to men.

Figure A.6 (a) in the Online Appendix shows a large increase in the amount of time people spent at the residency during Holi, while Figure A.6 (b) shows a large decrease in the number of people (arguably mostly women) in grocery stores and pharmacies.¹⁹ Overall, we observe a decrease in mobility (for women and men combined) during Holi.

While the GMI is daily and by district, it is not separated by gender.²⁰ We complement this information with data from the NFHS-4 survey which allows us to distinguish districts by the quality of women’s mobility based on the ease with which women can independently access markets, health facilities, and locations outside their community (see more information on Online Appendix B). Districts

¹⁹Part of this decrease might be due to the closure of some stores. A similar pattern occurs for the GMI of retail stores, in transit, and also the amount of people at work. Figures not shown.

²⁰One additional caveat: the GMI was mainly designed to analyze mobility during the COVID-19 pandemic and therefore the data is available since February 2020 up to the end of 2022. Regardless of the short time-frame, it is useful to assess individuals’ mobility and how this varies during Holi.

are classified into four groups according to the ability of women to move freely in public spaces. Figure A.5 in Online Appendix shows women have better mobility in districts where VAW is less justified.

More formally, Table A.5 in Online Appendix studies the impact of Holi on mobility, and whether the mobility during Holi differs across districts with different share of females justifying VAW. To obtain insights specifically into its impact on women’s mobility, we categorize districts based on the quality of women’s mobility.²¹

Table A.5 Panel (a) shows that Holi increases the amount of time people spend at home. Moreover, the impact of Holi is statistically indistinguishable across districts with different levels of women’s mobility. Similarly, Table A.5 Panel (b) shows that the amount of people visiting grocery shops and pharmacies is considerably lower during Holi. Again, the effect is similar across different types of districts.

Regarding the impact of gender norms (measured by the share of females/males justifying VAW) on mobility, we do not observe a clear impact of attitudes towards VAW on mobility during Holi. Across specifications, and regardless of analyzing time spent at home or visits to grocery shops and pharmacies or type of districts based on female mobility, there is no systematic pattern on whether gender norms impact the participation of individuals in Holi.²²

Overall, Table A.5 shows that while Holi reduces the number of people (men and women) in the streets, low women’s mobility during Holi does not seem to explain the higher VAW observed in districts where women do not justify VAW (see Table 3, columns (7)-(12)). Instead, the evidence seems to support more a male backlash effect as the main driver.

7 Discussion

This study examines the role of underlying gender norms on violence against women in public spaces. We use the Holi festivities as a natural experiment since harassment behavior is broadly condoned during Holi, allowing perpetrators to behave more according to their underlying norms. Using police reports, we find a substantial increase in assaults against women of nearly 170% during the festivities. Our analysis suggests that underlying gender norms are the main culprit of this surge in VAW. Districts characterized by high male’s tolerance for VAW have a notable rise in incidents of VAW during Holi indicating an intensification effect of underlying norms. Interestingly, districts where women are less tolerant of VAW observe a significant rise in VAW during the festival, indicating a backlash effect.

Our research highlights the prevalence of VAW in public places, an area that has received limited attention in previous studies. By focusing on the dynamics of public cultural events like Holi, the study deepens our understanding of how deeply rooted social norms about gender influence outcomes for women. Across the globe, festivities and cultural celebrations have served as platforms for challenging conventional norms and temporarily suspending social conventions. While these events are integral to a vibrant and diverse society, they may inadvertently create an environment that enables perpetrators, typically men, to act on harmful attitudes and behaviors toward women. By recognizing the potential for

²¹Note that it is not evident whether the *change* in the number of women in the streets during Holi should be larger or lower for more patriarchal places. On one hand, women’s mobility in patriarchal places might be already very constrained and hence there is no room for adaptation during Holi. On the other hand, women’s decision to go outside the household might be very susceptible to Holi in patriarchal places. Regardless of this, we should observe significant differences in mobility across districts during Holi if the how patriarchal are the places matters.

²²For districts with medium and high female mobility some point estimates are larger, yet statistically insignificant.

celebrations to reinforce these detrimental norms, targeted strategies can be developed to promote gender equality and create safe environments for everyone, regardless of gender. Previous policy interventions affecting gender norms have shown to be effective in decreasing VAW and gender inequities ([Bandiera et al., 2020](#); [Dhar et al., 2022](#); [Edmonds et al., 2023](#); [Shah et al., 2023](#)). In that same vein, interventions aimed at addressing harmful gender norm might promote gender equality in public spaces and reduce VAW.

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Online Appendix

Holi Crimes

Not intended for publication in printed version

Table of content:

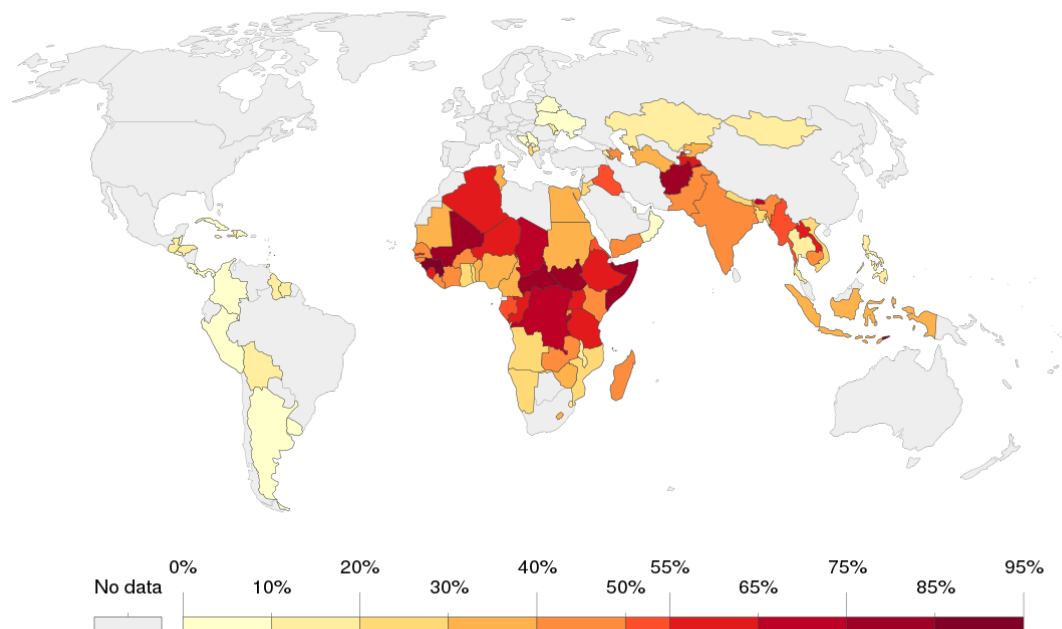
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A Other Figures and Tables

Figure A.1: Share of women who justify wife beating

Share of women who believe a husband is justified in beating his wife

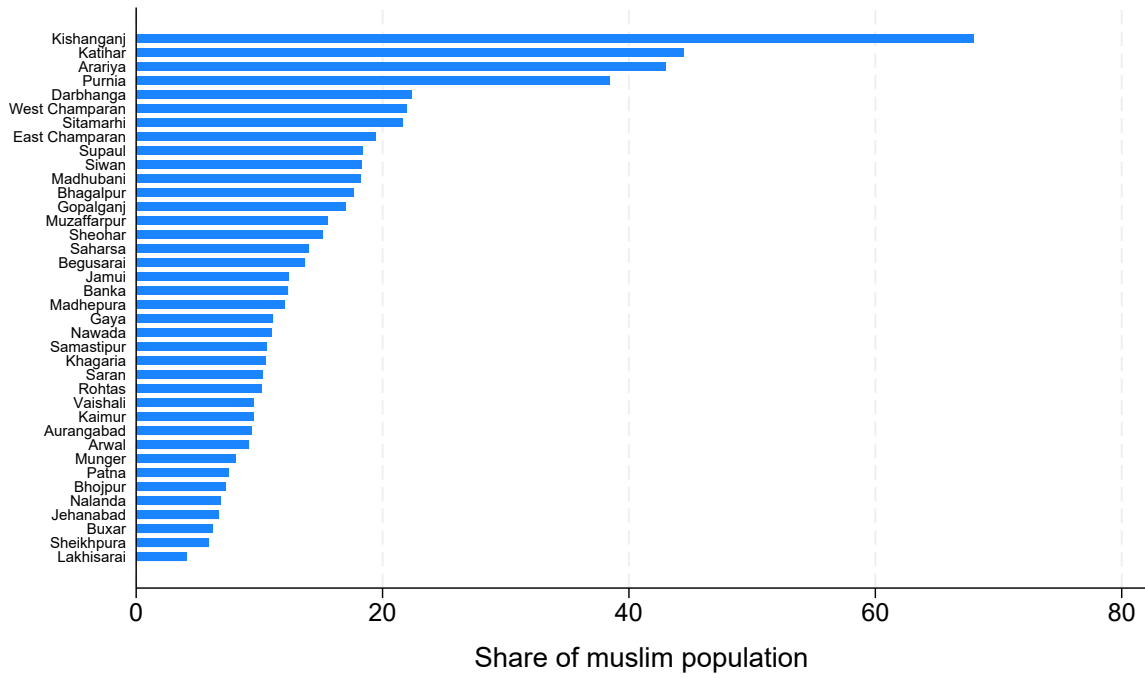
Percentage of women ages 15-49 who believe a husband/partner is justified in hitting or beating his wife/partner for any of the following five reasons: argues with him; refuses to have sex; burns the food; goes out without telling him; or when she neglects the children.



Source: World Bank

Notes: Share of women who consider a husband to be justified in hitting or beating his wife (for at least one of the specified reasons, i.e., if his wife burns the food, argues with him, goes out without telling him, neglects the children or refuses sexual relations). The average in India is 35% for males and 35% for females.

Figure A.2: Share of Muslim Population by Districts in Bihar



Notes: This figure shows the share of Muslim population for each district in Bihar according to the 2011 Census.

Table A.1: Dynamic Impact of Holi on Violence Against Women

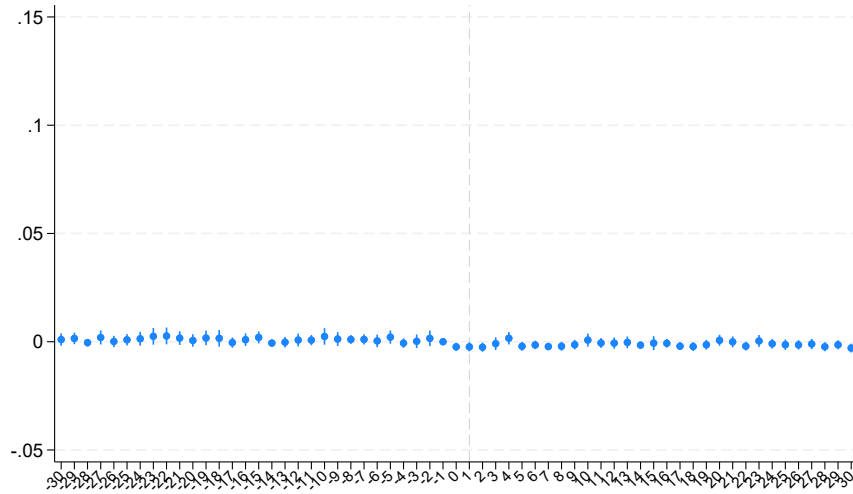
	Assault against women		Sexual Violence against women		Violence Against Women	
	(1)		(2)		(3)	
day_0	0.020	(0.007)***	0.012	(0.007)*	0.032	(0.011)***
day_1	0.078	(0.011)***	0.052	(0.010)***	0.127	(0.018)***
day_2	0.044	(0.006)***	0.029	(0.005)***	0.073	(0.010)***
day_3	0.007	(0.005)	0.005	(0.005)	0.011	(0.008)
day_4	0.009	(0.005)*	0.002	(0.005)	0.012	(0.010)
day_5	-0.002	(0.006)	0.002	(0.004)	-0.006	(0.007)
day_6	-0.001	(0.005)	0.004	(0.004)	-0.000	(0.007)
day_7	-0.001	(0.005)	0.002	(0.004)	0.001	(0.007)
day_8	0.001	(0.005)	0.007	(0.005)	0.007	(0.007)
day_9	-0.003	(0.005)	0.005	(0.004)	0.007	(0.007)
day_10	-0.003	(0.006)	0.006	(0.004)	0.003	(0.008)
Pre-Holi Mean	0.037		0.015		0.015	

Notes: This table shows the estimates from Equation 3 for assaults against women, sexual violence against women, and the aggregate measure of violence against women associated to Figure 2. Observations are daily at district level. Parentheses show clustered standard errors that are robust within districts.

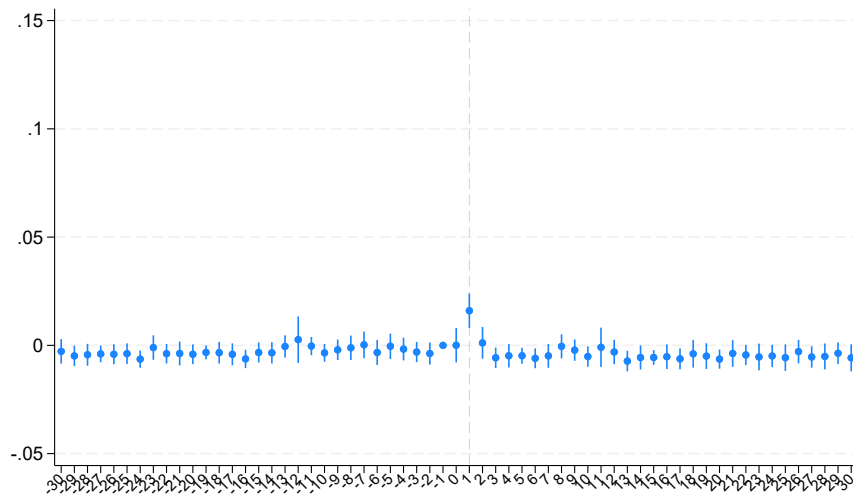
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A.3: Event-study plots of the impact of Holi on violence against men and civil servants

(a) Assault against men



(b) Assault against civil servants



Notes: This figure plots the coefficient $\{\phi_k\}$ from Equation 3 for each assaults against men. The figure shows 95% confidence intervals. Vertical line denotes the celebration of the festival of colours, Holi ($t = 1$).

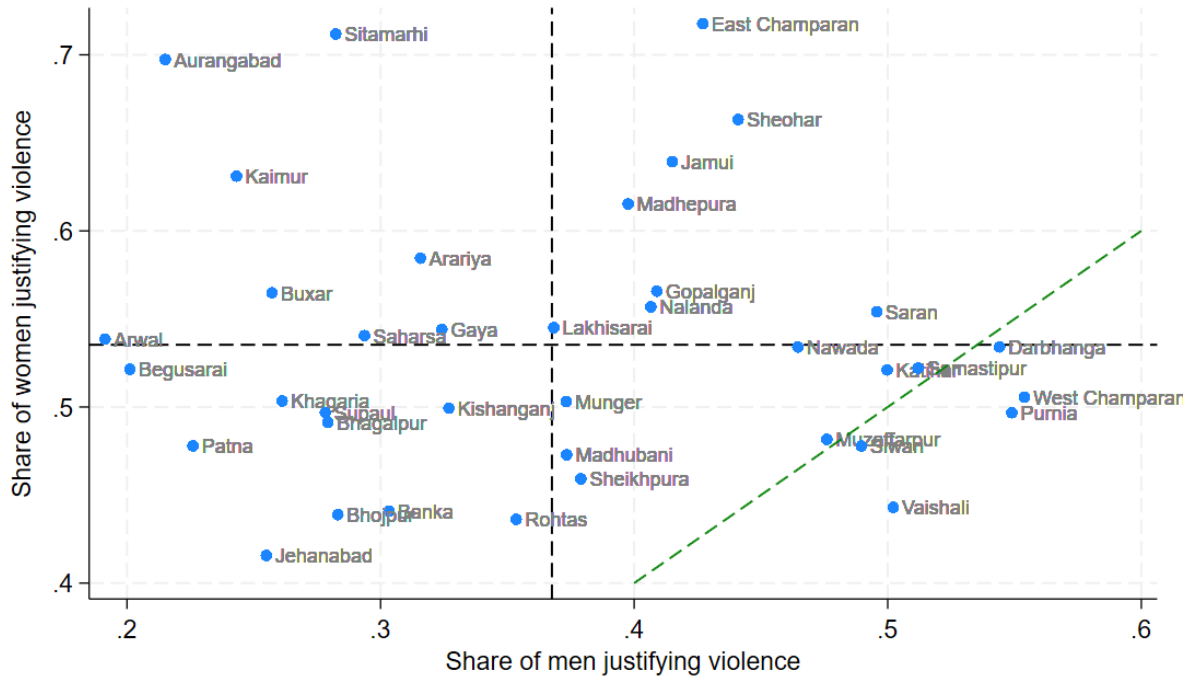
Table A.2: Impact of other Festivities on Violence Against Women

	Chhath Puja			Diwali			New Year			Independence Day		
	(1) Assaults Against Women	(2) Sexual Violence Against Women	(3) Violence Against Women	(4) Assaults Against Women	(5) Sexual Violence Against Women	(6) Violence Against Women	(7) Assaults Against Women	(8) Sexual Violence Against Women	(9) Violence Against Women	(10) Assaults Against Women	(11) Sexual Violence Against Women	(12) Violence Against Women
Chhath Puja	-0.001 (0.002)	-0.001 (0.002)	-0.004 (0.003)									
Diwali				0.003 (0.003)	0.005** (0.002)	0.009** (0.004)						
New Year							0.006 (0.005)	0.001 (0.003)	0.010 (0.006)			
Independence Day										-0.004 (0.005)	-0.004 (0.003)	-0.011 (0.008)
Observations	50,715	50,715	50,715	50,715	50,715	50,715	50,715	50,715	50,715	50,715	50,715	50,715
Dep. Var. Mean	0.045	0.031	0.088	0.045	0.031	0.088	0.045	0.031	0.088	0.045	0.031	0.088
Proportion	-0.032	-0.041	-0.043	0.066	0.165	0.100	0.138	0.046	0.111	-0.087	-0.137	-0.123
Day of the Week FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Day of the Month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table shows the impact of other festivities in Bihar on assaults against women. Observations are daily at district level. Parentheses show clustered standard errors that are robust within districts.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A.4: Share of Women and Men that Justify wife Beating



Notes: This figure shows the share of women and men that justify wife beating according to the National Family Health Survey (NFHS-4). The black dashed lines show the mean for each gender. The light gray dashed line shows the 45 degree line.

Table A.3: Summary statistics in Reporting Behavior by Criminal Offenses

	count	mean	sd	p50	p99
Reporting delay in assaults against women	65439	7.078	(17.262)	2.000	84.333
Reporting delay in sexual violence against women	43877	7.101	(19.405)	2.000	92.000
Reporting delay in crimes against women	126262	8.659	(18.159)	2.909	87.000
Reporting delay in assault against men	5840	2.846	(17.950)	0.000	52.000
Reporting delay in assault against women public servant	780	3.413	(18.903)	0.000	88.000
Reporting delay in assault against men public servant	12748	1.824	(11.456)	0.000	31.000
Observations	144989				

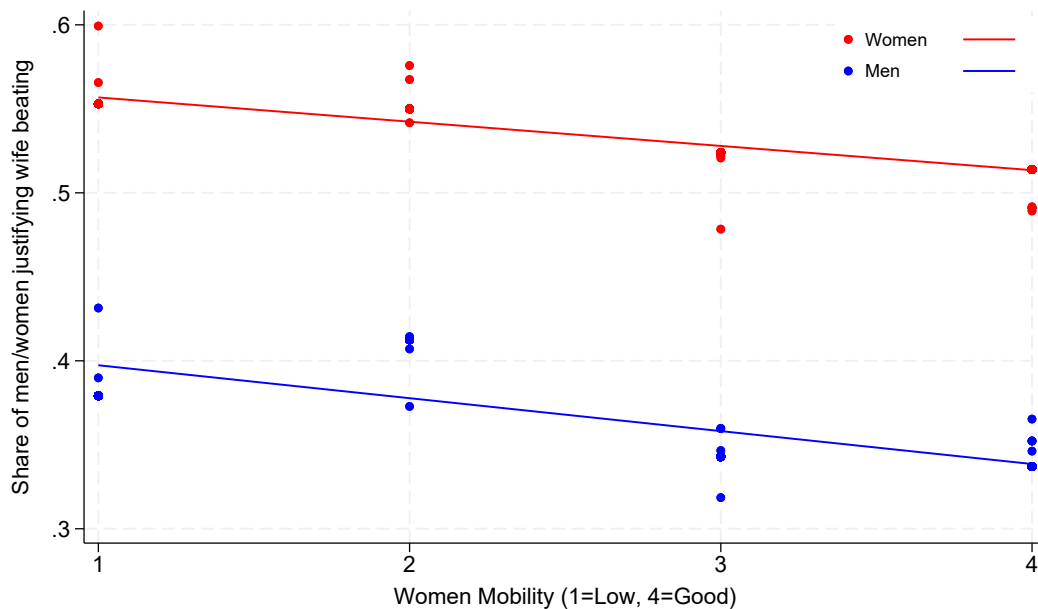
Notes: This table shows summary statistics regarding reporting behavior measured by the number of days taken to report the criminal incident.

Table A.4: Impact of Holi on Reporting Behavior and Women's attitudes towards VAW

	Delay in Assaults Against Women		Delay in Sexual Violence		Delay in Violence Against Women		Delay in Assaults Against Men		Delay in Assaults Against Public Servants	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Holi	1.279** (0.533)	-5.049 (4.746)	2.563*** (0.748)	-7.103 (7.159)	-0.825* (0.473)	-8.170* (4.348)	6.247*** (1.900)	1.225 (21.590)	-0.497 (0.364)	-0.511 (3.309)
Holi × Share of Women justifying VAW		10.786 (7.882)		19.411 (12.318)		12.315* (7.324)		-22.026 (37.145)		1.308 (5.028)
Holi × Share of Men justifying VAW		1.719 (4.663)		-1.041 (6.905)		2.316 (4.211)		41.534** (18.834)		-1.782 (3.617)
Observations	58,365	58,365	38,254	38,254	109,433	109,433	5,078	5,078	12,210	12,210
Dep. Var. Mean	6.409	6.409	6.399	6.399	8.230	8.230	1.534	1.534	1.104	1.104
Proportion	0.199	-0.788	0.400	-1.110	-0.100	-0.993	4.072	0.799	-0.450	-0.462
Adjusted R ²	0.091	0.091	0.055	0.055	0.090	0.090	0.019	0.020	0.010	0.010

Notes: This table shows the impact of Holi on reporting behavior measured by the number of days taken to report the criminal incident and how this varies by women's attitudes towards VAW. Observations are at criminal case level. Parentheses show clustered standard errors that are robust within districts.
 $*p < 0.10$, $**p < 0.05$, $***p < 0.01$

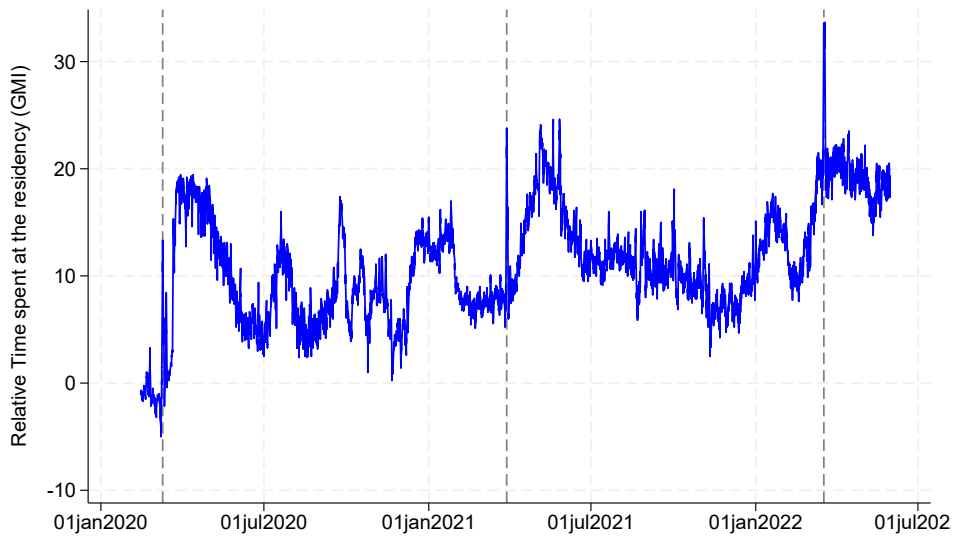
Figure A.5: Share of Women and Men that Justify wife Beating and Women mobility



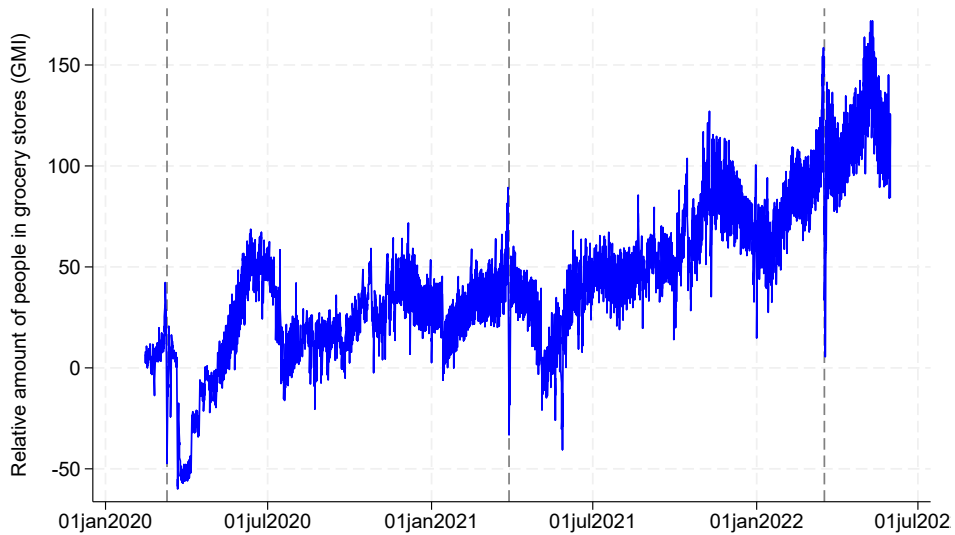
Notes: This figure shows the correlation between justification for wife beating by gender and women mobility index (1=low, 4=good).

Figure A.6: Individuals Mobility (Google Mobility Index)

(a) Relative Time spent at the residency



(b) Relative amount of people in groceries and pharmacies



Notes: Panel (a) shows the Google Mobility Index regarding time spent at the residency compared to the baseline (January 2020). Panel (b) shows the Google Mobility Index regarding the amount of people in groceries and pharmacies compared to the baseline (January 2020). The dates for Holi are denoted as vertical gray dash lines.

Table A.5: Impact of Holi on Mobility by Women's attitudes towards VAW

Panel A: Time spent at the residency										
	All districts		Low Female Mobility Districts		Medium Female Mobility Districts		High Female Mobility Districts		Very High Female Mobility Districts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Holi	9.706*** (0.414)	11.213*** (2.824)	9.557*** (0.573)	11.271*** (3.386)	8.770*** (0.965)	7.504 (10.613)	9.289*** (0.791)	3.652 (5.934)	11.098*** (0.917)	13.260** (5.153)
Holi × Share of Women justifying VAW		-2.820 (4.398)		-0.197 (4.573)		-3.963 (13.487)		0.458 (9.610)		-1.065 (7.973)
Holi × Share of Men justifying VAW		-0.037 (3.185)		-4.273 (5.469)		7.846 (11.797)		15.657* (7.839)		-4.790 (7.969)
Observations	20,608	20,608	5,686	5,686	4,592	4,592	5,165	5,165	5,165	5,165
Dep. Var. Mean	9.967	9.967	10.221	10.221	9.543	9.543	9.806	9.806	10.225	10.225
Proportion	0.974	1.125	0.935	1.103	0.919	0.786	0.947	0.372	1.085	1.297
Adjusted R ²	0.549	0.549	0.566	0.566	0.564	0.564	0.527	0.528	0.539	0.539

Panel B: Amount of People at Grocery stores & Pharmacies										
	All districts		Low Female Mobility Districts		Medium Female Mobility Districts		High Female Mobility Districts		Very High Female Mobility Districts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Holi	-46.313*** (2.332)	-61.436*** (16.967)	-48.209*** (4.119)	-86.776*** (21.710)	-44.760*** (3.072)	-3.929 (36.835)	-41.432*** (4.689)	-1.287 (27.625)	-49.745*** (6.570)	-71.902* (33.972)
Holi × Share of Women justifying VAW		33.302 (28.303)		42.834 (41.926)		-59.573 (63.645)		7.764 (39.394)		50.166 (54.688)
Holi × Share of Men justifying VAW		-6.675 (18.194)		40.244 (33.221)		-21.632 (27.129)		-121.554** (42.199)		-10.748 (42.882)
Observations	19,188	19,188	5,573	5,573	4,517	4,517	4,442	4,442	4,656	4,656
Dep. Var. Mean	25.266	25.266	32.504	32.504	23.431	23.431	24.206	24.206	19.394	19.394
Proportion	-1.833	-2.432	-1.483	-2.670	-1.910	-0.168	-1.712	-0.053	-2.565	-3.707
Adjusted R ²	0.533	0.533	0.515	0.515	0.539	0.539	0.447	0.448	0.597	0.597

Notes: This table shows the impact of Holi on mobility measured by the Google mobility Index and how this varies by women's attitudes towards VAW. Panel (a) shows the time spent at the residency while panel (b) shows the amount of people at grocery stores and pharmacies. Observations are at the district-day level. Parentheses show clustered standard errors that are robust within districts.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B Data Construction

B.1 Criminal Offenses

B.1.1 Criminal Offenses Against Women

We create three different variables to analyze criminal offenses against women: Assaults against women, sexual violence against women, and an aggregate measure of violence against women.

Table B.1 denotes the specific Indian Penal Codes and laws associated with the crimes that we analyze. Our variable of assaults against women is composed by those criminal incidents containing the criminal charge based on the Indian Penal Code 354 only. We construct another variable related to sexual violence against women based on (i) sexual harassment, (ii) acts with the intent to disrobe a women, (iii) voyeurism and (iv) stalking. Note that Indian penal codes related with rape (e.g., 375) are rarely observed in the database since the most sensible criminal cases such as rape or domestic violence should not publicly disclosed. Finally, we create another aggregate variable for violence against women incorporating sections 498 and 509 from the Indian Penal Code. All these criminal offenses are aggregated at the district level for each day.

Table B.1: Crimes Against Women and Criminal Offenses

Variable	Crime category
Assaults Against Women	Section 354. Assault or criminal force to woman with intent to outrage her modesty
Sexual Violence Against Women	Section 354 A. Sexual harassment. Section 354 B. Act with intent to disrobe a woman Section 354 C. Voyeurism Section 354 D. Stalking
Violence Against Women	Assaults Against Women + Sexual Violence Against Women + Section 498. Enticing or taking away or detaining with criminal intent a married woman Section 509. Word, gesture or act intended to insult the modesty of a woman

Notes: This table shows the criminal charges and enacted acts that are associated with our violence against women variables and assaults.

B.1.2 Assaults Against Men and Public Servants

We also analyze assaults against men. This variable captures all offenses that contains IPCs related with assault as describe in Table B.2. We extract those incidents where the victim is either a woman or a public servant.

Additionally, we analyze assaults against public servants since these are less likely to be underreported. We separated assaults against men public servant and women public servants. Most assaults against public servants are against men, as they compose the larger share of public servants.

Table B.2: Assaults Against men and Public Servants

Variable	Crime category
Assaults Against Men	Section 351. Assault Section 352. Punishment for assault or criminal force otherwise than on grave provocation Section 355. Assault or criminal force with intent to dishonour person, otherwise than on grave provocation Section 356. Assault or criminal force in attempt to commit theft of property carried by a person Section 357. Assault or criminal force in attempt wrongfully to confine a person Section 358. Assault or criminal force on grave provocation
Assaults Against Public Servant	Section 353. Assault or criminal force to deter public servant from discharge of his duty

Notes: This table shows the criminal charges and enacted acts that are associated with our violence against women variables and assaults.

B.1.3 Alcohol-related offenses

To address the potential impact of alcohol of VAW we create a measure to distinguish districts with high and low alcohol consumption. Alcohol related crimes are based on the Indian Penal Code 510 “Misconduct in public by a drunken person” and also based on the Bihar Prohibition and Excise Act, 2016 which prohibited liquor and intoxicants in the territory of the State of Bihar. Base on this alcohol related offenses we separate districts by high and low alcohol offenses. The low alcohol districts are Begusarai, Gopalganj, Madhepura, Siwan, Saran, Purnia, Vaishali, Kishanganj, and Darbhanga. The high alcohol districts are West Champaran, Aurangabad, Jehanabad, Bhojpur, Sheohar, Nawada, Buxar, Munger, and Patna.

B.2 Other information

Information on Women’s Mobility comes from the Bihar Gender Report Card 2019 ([Department of Social Welfare, Bihar, 2019](#)). Districts are classify as ‘Good performing’, ‘Promising’, ‘Low Performing’, and ‘Very Low Performing’, based on a composite index for performance on mobility among women, which measures percentage of currently married women aged 15-49, able to go to market, health facility, and places outside the village/community alone.

Google Mobility Index (GMI) provides daily information regarding people’s mobility by districts (not separated by gender), across different categories of places. Each data point provides the mobility for the report date with respect to the baseline day. Each day’s baseline is the median day-value from the 5-week period in January. The GMI data is available since February 15, 2020 and until October 15, 2022. More details on [Google Mobility Reports](#).

C Additional Analyses

C.1 Role of Alcohol on Violence Against Women During Holi

Although in our context, alcohol consumption is unlikely to be the main driver for the surge in VAW, illegal alcohol production and consumption can occur. In this section we further explore the role of alcohol during Holi celebration on VAW. We distinguish districts with high and low alcohol access using as a proxy the amount of alcohol related offenses (see details in Online Appendix B).

Table C.1 shows the impact of Holi across districts with different levels of access to alcohol (proxied by alcohol related offenses). We do not observe differences in the level of offenses against women for any of the three variables (assaults, sexual crimes, and aggregate violence against women). More importantly, the impact of Holi across districts with high and low alcohol consumption is statistically the same. This suggest that alcohol is not the main driver for violence against women in our context, otherwise we would have observed a larger impact in places with high alcohol consumption.¹

Table C.1: Impact of Holi on Violence Against Women by districts with high and low alcohol consumption

	Assaults Against Women		Sexual Violence Against Women		Violence Against Women	
	(1)	(2)	(3)	(4)	(5)	(6)
	Low alcohol	High alcohol	Low alcohol	High alcohol	Low alcohol	High alcohol
Holi	0.070*** (0.021)	0.061** (0.020)	0.038*** (0.011)	0.040** (0.017)	0.106*** (0.028)	0.097** (0.037)
Observations	15,452	15,449	15,452	15,449	15,452	15,449
Dep. Var. Mean	0.045	0.041	0.025	0.023	0.080	0.078
Proportion	1.563	1.476	1.526	1.739	1.325	1.238
Day of the Week FE	✓	✓	✓	✓	✓	✓
Month FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Day of the Month FE	✓	✓	✓	✓	✓	✓

Notes: This table shows the estimates from Equation 1 for different types of crimes against women by district with high and low alcohol related offenses. Alcohol consumption is proxied by the number of alcohol-related offenses. Observations are daily at district level. All regressions include day-of-the-week fixed effects, month fixed effects, year fixed effects, day of the month fixed effects. Parentheses show clustered standard errors that are robust within districts.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

References Appendix

Department of Social Welfare, Bihar (2019). Women & girls in Bihar: Taking stock, looking ahead - gender report card 2019.

¹We do not observe a significantly larger impact for districts with high alcohol consumption when approximating these by distant to neighboring districts where alcohol production, consumption and selling is not banned. In these cases, Holi's impact in border districts is not larger compared to inside districts in Bihar.