Violence and the labor supply of married women in India*

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Abstract

This paper examines whether fear and safety concerns have an impact on behavior such as female labor supply in a developing country context. The effect of media reported physical and sexual assaults on married women's labor force participation in India is investigated by combining nationally representative cross-sectional microeconomic surveys carried out between 2009 and 2012 with a novel geographically referenced data source on media reports of assaults. I find that a one standard deviation increase in lagged sexual assault reports within one's own district reduces the probability that a married urban woman is employed outside the home by 0.36 percentage points (or $3.2 - 3.7\%$ of the sample average), and reduces the probability that a married rural woman is employed outside the home by $0.23 - 0.30$ percentage points (or $1.8 - 2.5\%$ of the sample average), depending on the labor supply measure used. There is no effect of lagged physical assault reports on employment outside the home. I find these effects despite ruling out several sources of unobserved heterogeneity, and these effects are robust to a number of sensitivity checks. The effect of lagged sexual assault reports on labor supply is stronger among highly educated urban women, and weaker among older rural women.

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1 Introduction

Gender gaps or differences in labor market outcomes across men and women exist worldwide, but these differences are particularly stark in much of the developing world (Jayachandran 2015). While India has been characterised by high economic growth, increases in educational attainment and declining fertility over the last thirty years, female labor force participation rates have stagnated in urban households (Klasen & Pieters 2015) and fallen in rural households (Afridi et al. forthcoming). This is in contrast to developed countries which have seen large gains by women in labor force participation over time (Blundell & MaCurdy 1999). For instance, in 2011-2012 just 20% of working age Indian women (age 15-65) in urban households and 27% in rural households were in the labor force, while 81% of working age Indian men in urban households and 84% in rural households were in the labor force.[1] Labor force participation rates in 2012 for women in the US were 68%, in the UK were 71%, in Sweden were 78% and in Germany were 72%.[2] India's female labor force participation rates also compare unfavourably with other developing countries. For instance, using Demographic and Health Survey data from 63 developing countries from 1986 to 2006, Bhalotra & Umana-Aponte (2010) find that employment among women age 20-49 was 64% in Africa, 43% in Asia and 50% in Latin America. This paper investigates labor force participation decisions of married women age 25-55 in India, to understand how these women might play a more active role within the labor market.

Much of the literature on labor supply in developing countries has examined the role of individual covariates (such as age, education, race/ethnicity) or family attributes (such as spouse variables, number of children) in labor force participation decisions of married women. For instance Klasen & Pieters (2015) and Afridi et al. (forthcoming) investigate the role of these variables in participation decisions of married women in urban and rural India. This paper examines an additional potential determinant of married women's labor force participation decisions, which is currently under-explored. Recent increases in media reports of violence against women in India, specifically of sexual assaults and rapes, may have an unintended negative effect of deterring women from going out for work, in a society where the stigma costs of sexual assaults are high (Chakraborty et al. 2017, Borker 2018). This paper quantifies the effect of such reporting on whether women seek employment outside their homes. This paper makes a contribution to the literature on the labor supply determinants of married women in a developing country context, and

[1] Based on own calculations from the Employment and Unemployment schedule of the 68th round of the Indian National Sample Survey. Labor force status is defined using activity status over the previous year; a person is in the labor force if they are self employed, an unpaid family worker, a regular salaried employee, a casual worker or unemployed.

[2] Data extracted from http://stats.oecd.org.

additionally contributes to the literature on the distortive effects of fear (Becker & Rubinstein 2011).

I examine married women's labor supply in urban and rural households in India between 2009 and 2012 using the Employment and Unemployment schedules of the latest two rounds of the National Sample Survey (NSS). By combining these surveys with geographically referenced data on media reports of assaults, I am able to quantify the effect of violence in one's local area or district on labor supply decisions. To eliminate bias from local area specific unobservables as well as state specific time (quarter-year) shocks, I include local area and state-time fixed effects in all estimations. Finally, I use one period lags of media reports of assaults to examine the effect of these reports on married women's labor supply. Across different labor supply measures, I find that a one standard deviation increase in lagged reports of sexual assaults in the local area of a married woman from an urban household reduces the probability that she is employed outside the home by 0.36 percentage points (or $3.2 - 3.7\%$ of the sample average). A one standard deviation increase in lagged reports of sexual assaults in the local area of a married woman from a rural household also reduces the probability that she is employed outside her home, but by less, at $0.23 - 0.30$ percentage points (or $1.8 - 2.5\%$ of the sample average). These results are robust to changes in the estimation sample, variable definitions and the set of control variables. I find the negative effect of media reporting of sexual assaults on female labor supply to be stronger among highly educated married urban women, and weaker among older married rural women.

Section 2 provides an overview of existing research, section 3 describes the estimation methods employed, section 4 discusses the data set and estimation samples, section 5 discusses the estimation results while section 6 concludes.

2 Existing research and contribution

In unitary or collective household models, a household maximises a single utility function assumed to be increasing in leisure time and consumption, given a common household budget constraint (for instance, see Becker 1965). These models predict that as the wage offer of a married woman increases, there is an increase in her labor supply due to a substitution effect (as the opportunity cost of leisure increases) and an opposing decrease in her labor supply due to an income effect (as the demand for leisure, a normal good, increases). At the extensive margin there is no income effect, so an increase in the wage offer should always increase labor force participation. These models also predict that an increase in unearned income

should reduce labor supply due to a pure income effect.[3]

A large empirical literature within labor economics has examined the responsiveness of labor supply to wage offers.[4] In this paper I do not examine own wage effects on labor force participation since wages are only observed for a small fraction of married Indian women, so that the estimated wage elasticities are sensitive to the method used to assign wage offers to the self-employed, those in unpaid family work and non-workers.

A U-shaped relationship between female labor force participation and economic development has been documented in a number of studies (Boserup 1970, Goldin 1995, Mammen & Paxson 2000, Heath & Jayachandran 2005). For very poor countries female labor force participation is high as women work primarily as unpaid family workers on the farm or in non-farm family enterprises. As countries initially develop there is a strong negative income effect which dominates the substitution effect, depressing married women's labor supply. At this stage of development, men gain employment in blue-collar manual jobs while opportunities for women are limited to manual work outside the home against which a strong social stigma exists. As countries continue to develop, the negative income effect becomes less important and the positive substitution effect dominates, increasing female labor supply. Women are able to find work in white-collar jobs against which there is no social stigma.

We expect higher education to increase female labor supply due to a strong substitution effect, as the opportunity cost of leisure for highly educated women will be greater than for women with lower education. While most empirical studies confirm this (Psacharopoulos & Tzannatos 1989, Grepin & Bharadwaj 2015, Erten & Keskin 2018), some find no effect of increased education on female labor supply (Andrabi et al. 2012). In general, we also expect that a larger number of young children in the family will reduce the mother's labor supply. However, empirical studies either support this hypothesis (Goldin & Katz 2002, Bloom et al. 2009, Miller 2010), or find no effect of fertility on women's labor supply (Aguero & Marks 2011). Female labor supply is also likely to increase with decreases in time required for household production (Greenwood et al. 2005), with availability of jobs in which women have a comparative advantage (Jensen 2012, Pitt et al. 2012, Heath & Mobarak 2015), and with changes in cultural norms (Fernandez et al. 2004).

Demographic variables such as ethnicity/race are also likely to have an impact on labor supply deci-

[3]Research using non-cooperative bargaining models considers situations in which increases in a woman's command of resources gives her greater bargaining power within the household, and might increase labor supply; see Strauss & Thomas (1995), Heath & Tan (2016).

[4]See the review by Blundell & MaCurdy (1999) and references cited therein. Some examples are Blau & Kahn (2007), Heim (2007) who documented the fall in wage elasticities for married women in the US over time.

sions. In the case of India women from Muslim and high caste Hindu households have persistently low labor force participation rates compared to women who belong to lower caste Hindu households. This is attributed to a higher cost of social stigma associated with outside work assigned by these social groups (Klasen & Pieters 2015).

Recent research indicates that safety concerns of women outside the home are also likely to play an important role in whether they seek outside employment in India. For instance, Borker (2018) shows that women are willing to choose a college in the bottom half of the quality distribution over a college in the top half at the University of Delhi for a travel route that they perceive to be one standard deviation safer. In a recent paper Chakraborty et al. (2017) use data from the 2005 wave of the India Human Development Survey (IHDS) to show that in neighborhoods where the self reported level of sexual harassment against women is higher they are less likely to seek outside employment. Chakraborty et al. (2017) find this to be the case for urban women only.

There is also a literature examining how fear can have an impact on individual choices, to which this paper makes a contribution. For instance, Becker & Rubinstein (2011) investigate how fear of terrorist attacks has an impact on usage of goods and services subject to these attacks. Fear of public spaces following media coverage of sexual assaults can similarly deter women from going out for work. According to a survey carried out in Delhi in 2012 following the rape and subsequent death of a Delhi woman on a moving bus which was widely reported in the media, nearly 73% respondents said that women face sexual violence in their neighborhoods, and more than half stated that these spaces are unsafe at all times. Almost 20% of the respondents stated they were fearful when going out alone in the daytime and an additional 10% percent stated they would not venture out alone at all. These fractions were 63% and 21% when respondents expressed safety concerns for going out after it was dark (UN & ICRW 2013).

I use data from the 2009-10 and 2011-12 rounds of the Indian National Sample Surveys (NSS), and combine these data with a novel geographically referenced data source on media reports of physical and sexual assaults that occur in each respondent's local area in the previous time period. Whilst this data source (the Global Database on Events, Language and Tone, or GDELT) has been used in existing research in political science and economics, its use in research on violence against women remains unexplored. It allows me to construct a measure of media reports on sexual assaults which is less prone to measurement error, in comparison with self reported perceptions of sexual harassment, aggregated at the neighborhood level, which is used by Chakraborty et al. (2017). Additionally I can exploit variation over time as well as across regions when using media reported sexual assaults. Similarly to Chakraborty et al. (2017), I find a

statistically significant negative effect of lagged sexual assault reports on labor supply for married urban women. However, contrary to Chakraborty et al. (2017), I find a smaller but also statistically significant negative effect of lagged sexual assault reports on labor supply for married rural women. There is no effect of physical assault reports on labor force participation, for either married urban or rural women.[5]

In terms of other determinants of labor supply, I am able to find the effect of spouse and child variables on married women's labor supply by restricting the estimation sample to wives of the household head. I find the highest labor force participation among the least and highest educated women, consistent with existing studies (Klasen & Pieters 2015, Afridi et al. forthcoming). I find that very young children (younger than two years of age), reduce the probability that a married woman will be employed outside the home. The higher the education of the spouse the less likely that a married woman is employed outside the home. Finally, I also find that labor force participation rates are lowest among Muslim and high caste urban women.

3 Estimation methods

I estimate variations of the following reduced form labor force participation equation:

$$L^j_{idsr} = \beta^j_0 + \beta^j_1 Y_{idsr} + \beta^j_2 X_{idsr} + \beta^j_3 P_{ds,r-1} + \beta^j_4 S_{ds,r-1} + \gamma_d + \gamma_{s\times r} + u^j_{idsr} \quad (1)$$

L^j_{idsr} is a labor force participation measure for married female i who resides in district d, state s and interviews in NSS sub-round r. I use three different measures which capture whether or not the married female *works outside her home*: (i) L^1_{idsr} is a binary variable taking the value one if the married female spends a positive fraction over the past seven days in either regular or casual employment based on daily activity status, (ii) L^2_{idsr} is a binary variable taking the value one if the married female is employed in regular or casual employment over the past year according to usual principal activity status and (iii) L^3_{idsr} is a binary variable taking the value one if the married female is employed according to usual principal activity status *and* the location of her workplace is not within or adjacent to her dwelling place.

The right hand side variables include the married female's household per capita weekly consumption Y_{idsr}. They include the vector X_{idsr} which consists of a set of education dummies for own and spouse education, a cubic in own and spouse age, a set of variables giving the number of own children in different

[5] While many of the signs of effects are similar to those found by Chakraborty et al. (2017), there are difficulties in making a direct comparison of effect sizes given the differences in regressors as well as time period under study. Nevertheless, I discuss the main similarities and differences in section 5.1.

age groups, and a set of household social group (religion and caste) dummies.

$P_{ds,r-1}$ is the number of physical assault reports in the married female's own district and state in the three months immediately preceding the NSS sub-round in which labor force participation is elicited, while $S_{ds,r-1}$ is the number of sexual assault reports. The parameters β_3^j and β_4^j quantify the effect of an additional report of physical and sexual assault in one's own district in the past three months on labor supply measure $j \in \{1, 2, 3\}$ today. Lagged assault reports are used as regressors since it is less likely that these are correlated with unobserved heterogeneity, which would lead to biased estimates.

To rule out bias due to unobserved heterogeneity that is local area (district) specific, and state-time (quarter-year) specific, I also include district fixed effects γ_d, and state times NSS sub-round fixed effects $\gamma_{s\times r}$. For instance bias due to cultural factors which are region specific, and which are likely correlated with both labor supply and media reported assaults would be eliminated by the use of district fixed effects. Possible bias due to state and time (quarter-year) specific macroeconomic shocks that influence labor supply and are likely correlated with the regressors would be eliminated by the use of state-time fixed effects. Standard errors are adjusted for clustering at the district level. All estimations are carried out separately for urban and rural households.

To investigate heterogeneity in the effect of sexual violence on labor supply, the following regressions are estimated:

$$L^j_{idsr} = \alpha^j_0 + \alpha^j_1 Y_{idsr} + \alpha^j_2 X_{idsr} + \alpha^j_3 P_{ds,r-1} + \alpha^j_4 S_{ds,r-1} + \alpha^j_5 (S_{ds,r-1} \times G_{idsr}) + \gamma_d + \gamma_{s\times r} + \epsilon^j_{idsr} \quad (2)$$

The parameter α^j_5 captures the differential effect of lagged sexual assault reports on labor supply measure $j \in \{1, 2, 3\}$ for group G compared to everyone else. G_{idsr} is a binary variable which takes the value one if married female i from district d, state s and NSS sub-round r belongs to group G and zero otherwise. I examine heterogeneity by age, skill and social (caste and religious) affiliation.

4 Data and estimation samples

4.1 Data on the labor market

Data on the Indian labor market is taken from the Employment and Unemployment schedules of the Indian National Sample Survey (NSS). I use the two most recent 'thick' rounds of the NSS: round 66,

fielded between July 2009 and June 2010, and round 68, fielded between July 2011 and June 2012. There are four quarters, also referred to as sub-rounds, within each round. These data include a wealth of individual and household variables, and are the most widely used source of information on the Indian labour market.

The dependent variable of interest is whether or not a female respondent to the survey *works outside her home*. I construct three alternative measures of this dependent variable, from questions on daily activity status over the past week, usual principal activity status over the past year, and a question on location of the workplace.[6] Each survey respondent is asked about their activity particulars over the last seven days, which includes questions on daily activity status. These questions reveal information on whether the respondent spent any time in regular salaried employment or casual employment over the last week. Since either of these two activities are highly likely to involve work outside the home, I use this information to construct my first measure. L^1, is a binary variable taking the value one if the respondent spent a positive fraction of the past seven days in either regular salaried or casual employment. Each survey respondent is also queried about their principal activity status, or activity status over the last year. Responses to this question reveal information on whether the respondent spent most of their time in the last year on either regular salaried or casual employment. This information is used to construct the second measure of participation. L^2, is a binary variable taking the value one if the respondent spent most of their time in the last year on either regular salaried or casual employment. Following the questions on usual principal activity status, survey respondents are asked details about the location of their workplace. I use this information to construct the third measure of participation. According to this measure, L^3, a married female is considered to be working outside her home if she is employed according to usual principal activity status (in either of self-employment, unpaid family work, regular salaried employment, or casual employment) and additionally, the location of her workplace is not within or adjacent to her dwelling. Since not all respondents who are employed according to usual principal activity status provide details on workplace location, the estimation sample when using L^3 is smaller than when using L^1 or L^2.

Amongst the variables whose relationship with labor force participation is examined are education, number of children and social group. For education, a set of dummy variables is used for whether or not a person is literate, has primary education, has middle education, has secondary education and has more than a secondary education. The omitted category is illiterate.[7] To examine the influence of number of children the number of own children less than or equal to two years old, the number of own children

[6] The question on workplace location is only available in the latest two rounds of the NSS.

[7] These variables are based on a question asking respondents their level of highest completed education.

between three and four years old, and the number of own children between five and ten years old is used. Social groups include religious and caste groups in India; a set of dummy variables indicating the respondents religious and caste affiliation are used for social group affiliation. I include dummy variables for whether a respondent belongs to the historically disadvantaged Scheduled Caste (SC) or Scheduled Tribe (ST) groups; whether a respondent is non-SCST and belongs to the Muslim religion; whether a respondent is non-SCST and belongs to the Other religion[8]; and whether a respondent is non-SCST and belongs to a low caste Hindu group referred to as Other Backward Caste (OBC). The omitted category is Other Hindu, which consists primarily of high caste Hindus.[9]

4.2 Data on media reported violence

Data on media reports of different kinds of assaults is extracted from the Global Database of Events, Language and Tone (GDELT). This is a very large, open source database which collects information on political events in the area of verbal and physical mediation and conflict based on an automated textual analysis of newswires.[10] GDELT includes over a quarter-billion event records in over 300 categories across the globe, from 1979 to the present. Events in the database are sourced from digitalised newspapers, news agencies and web based news aggregators such as GoogleNews. Data is extracted from these sources using an open source coding algorithm TABARI (Text Analysis by Augmented Replacement Instructions) that searches through news articles using CAMEO (Conflict and Mediation Coding System), a widely used coding system in political science.

The database includes information on the type of event which was reported in the media, the day and location of the event, as well as the number of articles in which the event was reported.[11] Of the different event categories, I extracted data on physical assault events or 'physical assaults, not specified below,' which are defined as 'attack physical well-being of individuals without the use of weaponry, not otherwise specified'; this event category consists primarily of beatings. To these incidents I also add events involving 'torture' and 'kill by physical assault.' Sexual assault incidents are a separate event category, and are defined as 'sexually abuse, assault sexual integrity of individuals.'

Data on physical and sexual assault incidents is matched to individual districts using the 2011 Census administrative boundaries.[12] Incidents and the number of articles in which they are reported (or assault

[8] Other religion includes Christian, Sikh, Jain, Buddhist, Zoroastrian or Other.

[9] These dummy variables are constructed from two questions, the first asking respondents their social group (SC, ST, OBC, Other) and the second asking respondents their religion.

[10] Data available from https://www.gdeltproject.org.

[11] For location the latitude and longitude of the landmark-centroid are provided.

[12] I only keep incidents that have been matched by the database at the level of a city or landmark outside the US, which

reports) are then aggregated at the district level and over the three months preceding each quarter or NSS sub-round in the estimation sample. The aggregated district-NSS sub-round data on assaults is then merged with the individual level NSS data.

4.3 Estimation sample and summary statistics

The estimation sample consists of married women who are wives of the household head age 25-55. This age restriction is fairly standard in the literature, as women age 25-55 have likely completed their education, are of working age and most likely to be active in the labor market. Within this age group, almost 90% of women are married. A further restriction to wives of the household head is made to construct spouse and child variables from the NSS data, as it is not possible to construct these variables for other household members.

The dependent variable of interest is employment outside the home. Three different measures of this variable are constructed; L^1 exploits daily activity status over the past seven days, L^2 exploits usual principal activity status over the past year and L^3 exploits information on location of the workplace.[13] Figure 1 shows the time allocation of married women in the past week. L^1 considers a married female as employed outside her home if she spends a non-zero fraction of time in the past seven days in either regular salaried or casual employment according to daily activity status. From Figure 1, most of the time in the previous week is spent by women outside of the labor force. Rural women spend a higher fraction of their time in self-employment or in unpaid family work. Figure 2 shows the type of work undertaken by married women based on usual principal activity or activity status over the past year. This is very similar to Figure 1 in that overall employment is quite low, and rural women are more likely to be undertaking self-employment and unpaid family work. Figure 3 shows the fraction of married women in the sample who indicate their workplace is not within or adjacent to their dwelling by type of work. As expected, this fraction is highest among regular salaried workers and among casual workers.[14]

Table 1a gives the summary statistics for the urban estimation sample by NSS round, while Table 1b gives summary statistics for the rural estimation sample. The average age of women, at 39 years, is very similar across the urban and rural samples, as well as over time. Household consumption per capita is higher in urban than rural areas. Both the urban and rural samples have seen gains in household

are 91.86% of all events over the respective time frame.

[13]Note that since not all women who are employed according to usual principal activity status provide information on workplace location, the estimation sample when using L^3 is smaller than when using L^1 or L^2.

[14]Correlation between the three labor supply measures is high among urban women (between L^1 and L^2 it is 0.95, between L^1 and L^3 it is 0.83 and between L^2 and L^3 it is 0.87), and lower but still positive among rural women (between L^1 and L^2 it is 0.82, between L^1 and L^3 it is 0.55 and between L^2 and L^3 it is 0.66).

consumption per capita over time, with higher levels in the 68th compared to the 66th NSS round.

Disadvantaged caste groups such as Hindu OBC (30% of urban and 33% of rural households) and SCST (22% of urban and 35% of rural households) are more likely to be found among rural than urban households. Hindu Other or high caste (29% of urban and 18% of rural households), Muslim (15% of urban and 11% of rural households) and Other religion (4% of urban and 3% of rural households) households are all more likely to be found in urban than rural households. Figure 4 gives the labor force participation rates by social group in the estimation sample, for each of the three labor supply measures. Across all measures, and for both urban and rural married women, labor force participation rates are highest among low caste women (Hindu OBC and SCST), and among women who belong to the Other religion category. Labor force participation rates are lowest among Muslim women, followed by high caste Hindu women.

The average age of spouses is approximately 44 years, and is fairly similar across the urban and rural samples, as well as over time. As also shown in Figure 5, which gives the education of the women by NSS round and urban status, women in urban areas have higher education, and education levels overall have improved over time in both the urban and rural samples. Figure 5 also gives the education of spouses of married women (household heads), by NSS round and urban status. Husbands have better education than wives. Husbands in urban areas have higher education than husbands in rural areas, and education levels for husbands have improved over time in both urban and rural samples.

The number of own children is higher in rural than urban areas. On average, there are 0.11 children under the age of 2 for both urban and rural women. There are 0.12 children between the age of 3 and 4 for urban women, and 0.14 children within this age group for rural women. There are 0.54 children between the age of 5 and 10 for urban women, and 0.62 children within this age group for rural women.

Descriptive statistics for the merged data on assaults are given in Table 2. Physical assaults occur more than twice as frequently as sexual assaults, on average. While there is a small increase in both physical and sexual assaults over time (see also Figure 6), there is far more variation in assaults across districts as indicated by the large standard errors. The number of assault incidents which are reported in districts in which urban women live compared to districts in which rural women reside is more than three times as high for physical assaults and more than four times as high for sexual assaults. There is also a slightly higher media coverage of assault incidents in districts in which urban women live, as given by a slightly higher number of articles per incident.

The distribution of physical and sexual assault incidents aggregated to Indian states is given in Figures 7 and 8. The states Maharashtra and Uttar Pradesh tend have more physical and sexual assault incidents

than other states. The distribution of physical and sexual assault reports aggregated to Indian states is given in Figures 9 and 10. As with the distribution of assault incidents, physical and sexual incident reports are also higher in Maharashtra and Uttar Pradesh compared with other Indian states. While Maharashtra has a high proportion of urban respondents (47.6% of the estimation sample compared to the all India average of 38.68%), this is not the case for Uttar Pradesh (where 35.24% of the estimation sample is urban). It is also important to note that the number of physical and sexual assault incidents/reports taking place in the city of Delhi, which is also the capital, is very high. Since Delhi only occupies a small geographical area, it cannot be seen clearly in these Figures, but the numbers of assault incidents/reports in Delhi is comparable to those occurring over the whole states of Maharashtra and Uttar Pradesh.

5 Estimation results and discussion

5.1 Baseline estimation results

The estimation results from estimating equation (1) are reported in Table 3a for the urban estimation sample and Table 3b for the rural estimation sample. The three different measures of labor force participation are used across columns as the dependent variable. Most of the effects are consistent across different labor supply measures ie across columns.

For women in urban households, lagged reports of physical assaults have no effect on labor force participation, but lagged reports of sexual assaults have a statistically significant negative effect. A one standard deviation increase in the number of sexual assault reports reduces the probability that a married female works outside her home by 0.36 percentage points, depending on the labor supply measure used. This effect is $3.2 - 3.7\%$ of the urban sample average of different labor supply measures used.

I find that labor force participation is highest among women without any education and among women with more than a secondary education in urban households. Married urban women who are literate but with less than a primary education are $1.7 - 2.1$ percentage points less likely to be employed outside the home, those with a primary education are $2 - 2.4$ percentage points less likely to be employed outside the home, those with a middle education are $3.9 - 4.2$ percentage points less likely to be employed outside the home, and those with a secondary education are $2.6 - 2.8$ percentage points less likely to be employed outside the home compared to married urban women without any education. However, married urban women with more than a secondary education are $10 - 11$ percentage points *more* likely to be employed outside the home compared to married urban women without any education.

Urban muslim women are $4.3 - 5.3$ percentage points less likely to be working outside the home compared to high caste hindu women, depending on the measure of labor force participation used. Low caste groups such as SCST and OBC are more likely to be working outside the home compared to high caste Hindu women, by $5.9 - 6.8$ and $0.8 - 1.3$ percentage points respectively.

The sign and size of the effect of education and social group on labor force participation of urban married women is consistent with the results reported in Klasen & Pieters (2015) who also use the Indian NSS. This is despite differences from this paper in the dependent variable used, as well as in estimation methods and functional form.[15] Like this paper, Klasen & Pieters (2015) find a U-shaped relationship between own education and labor force participation, as well as lower participation of Muslim and high caste Hindu women in urban households.

A difference from Klasen & Pieters (2015) is the restriction to wives of household heads, allowing me to examine the effect of spouse and own child variables on labor force participation.[16] I find that higher spouse education reduces the probability that a married woman is working outside the home, due to a negative income effect. This effect is strongest for women who are married to men with a secondary or higher education. These women are $10 - 11$ percentage points less likely to be employed outside the home compared to women whose husbands are illiterate. Women who have children younger than two years old are also $1.8 - 2.4$ percentage points less likely to be employed outside the home compared to women who have no children.

For women in rural households, there is also no effect of lagged physical assault reports on labor force participation today but a negative effect of lagged sexual assault reports on labor force participation. This effect is statistically significant at the 5% level and smaller in magnitude than the effect for women in urban households. A one standard deviation increase in the number of sexual assault reports reduces the probability that a married female works outside her home by $0.23 - 0.30$ percentage points, depending on the labor supply measure used. This effect is approximately $1.8 - 2.5\%$ of the rural sample average of different labor supply measures used.

As with married women in urban households, labor force participation is highest among married rural women with the lowest and highest education, ie with no education and with secondary or higher

[15] Klasen & Pieters (2015) use a labor supply measure derived from usual principal activity status which includes self employment, unpaid family work and unemployment, as well as regular salaried and casual work. They also use a non-linear probit specification, with state fixed effects rather than district and state-time fixed effects, and a number of district level controls. Finally, they estimate reduced form labor force participation equations separately for the NSS rounds, rather than pooling the rounds together, and including state and sub-round specific fixed effects as is done in this paper.

[16] Instead Klasen & Pieters (2015) use the education of the household head to control for household wealth, and number of children within different age groups in the whole household as controls.

education. Married rural women who are literate but with less than a primary education are $1.4-2.1$ percentage points less likely to be employed outside the home, those who have primary education are $1.4-1.7$ percentage points less likely to be employed outside the home, those who have middle education are $1.8-2.5$ percentage points less likely to be employed outside the home, and those with a secondary education are not statistically significantly different from married rural women without any education. Married rural women with more than a secondary education are $12.6-13.8$ percentage points *more* likely to be in the labor force than married rural women without any education.

As in urban households, married women in rural households who belong to low caste groups such as SCST and OBC are more likely to be employed outside the home compared to high caste Hindu women by about $4.6-7.6$ and $1.9-2.2$ percentage points respectively. Muslim women are also less likely to be employed outside the home compared to high caste Hindu women, but this effect (at $0.8-2.5$ percentage points) is smaller than in urban households.

As with married women in urban households, labor force participation declines monotonically with husband's education. The higher educated the husband, the lower is labor force participation of the wife, capturing the negative income effect that was also found among urban households. Married women in rural households who have children younger than two years are $2.3-2.6$ percentage points less likely to be employed outside the home. Older children, between the ages of five and ten, actually increase the probability that a married woman is employed outside the home by $0.3-0.7$ percentage points. This could be because older children take care of younger siblings and household chores, freeing up more time for married women to carry out employment outside the home.

The effect of education on married women's labor supply among rural households is fairly consistent with Afridi et al. (forthcoming), who also use the Indian NSS. Despite differences from this paper in the dependent variable used, in functional form and estimation method, Afridi et al. (forthcoming) also find evidence of a U-shaped relationship between own education and labor force participation, as well as a monotonic decline in participation with increases in male education.[17]

Similar to this paper, Chakraborty et al. (2017) also find a large and statistically significant negative effect of self reported sexual harassment in the neighborhood on labor force participation of married urban women using the 2005 cross-sectional data from the India Human Development Survey. They find that a 1% increase in self reported sexual harassment reduces participation in work outside the home by 17%.

[17] Afridi et al. (forthcoming) use usual principal and subsidiary status to construct a measure of labor force participation which takes the value one for women who are working or seeking work. They estimate logit regressions using an estimation sample of married women age 25-65, and employ a different set of control variables than used in this paper.

They find no effect of self reported sexual harassment on participation of married rural women. While the sign of the effect for urban women is similar to what is found in this paper the size of the effect is much larger in Chakraborty et al. (2017). This could be due to the self reported measure of sexual harassment used in Chakraborty et al. (2017) capturing a larger number of incidents of harassment than are reported in the media as sexual assaults. Unlike this paper, Chakraborty et al. (2017) do not find an effect of self reported sexual harassment for married rural women. This could be due to less variation in the measure of self reported sexual harassment they use which is measured at the neighborhood level and for a single cross-section. It is also possible that the relationship between safety concerns and female labor supply was different in 2005 than in the more recent period (between 2009 and 2012) examined in this paper.

5.2 Heterogeneity results

In order to understand the mechanisms behind the relationship between sexual assault reports and labor supply, I estimate and report results for equation (2). I examine heterogeneity across social groups, by education and by age.

It is possible that the fall in labor supply which arises from increased sexual assault reports is due to the stigma costs associated with sexual assaults. We already know that stigma costs of outside work for Muslim and high caste women are higher than other social groups, so as a first check I examine whether the negative effect of sexual assaults on labor supply is also stronger for Muslim and high caste women. The results are reported in Table 4a. In these estimations the reference group consists of all social groups *apart* from Muslim and high caste Hindu women. I don't find evidence of a stronger effect among either Muslim or high caste Hindu women which would indicate a higher stigma cost among these groups; in fact, if anything the negative effect of lagged sexual assault reports on labor supply is *weaker* among high caste Hindu women in urban households, and among Muslim women in rural households.

Another possibility is that the negative effect of sexual assaults on labor supply is weaker among highly educated women, since their opportunity cost of foregoing work is higher than women who are less educated. In order to test this, I re-estimate equation (2) but now introduce interactions of sexual assault reports with whether or not a married woman has less than primary education and whether or not a married woman has a secondary or higher education. The results are reported in Table 4b. Again, I find that the negative effect of sexual assaults is *stronger* among highly educated women in urban households. I don't find any differential effect for either low or high educated women in rural areas.

If the negative effect of sexual assaults on labor supply arises due to a stigma effect associated with

being sexually assaulted, then the effect should be weaker among older women. I divide women into three age groups, between 25 and 34 years of age, between 35 and 44 years of age, and between 45 and 55 years of age. I re-estimate equation (2), but now interacting lagged sexual assault reports with the age group a woman belongs to. The differential effects for younger women (of ages 25 to 34) and older women (of ages 45 to 55) are reported in Table 4c. I find that the effect of sexual assaults on labor supply is weaker for older women in rural households.

5.3 Robustness checks

In this sub-section I report a number of robustness checks to examine whether the negative relationship between lagged reports of sexual assaults and married women's labor supply persists after alterations of the estimation sample, variable definitions, and the set of control variables. I find the negative relationship to be robust to alterations across all of these dimensions.

A very large number of sexual assault reports over this time period are from the city of Delhi.[18] As a first robustness check, I drop Delhi and other small Indian states from the estimation sample and re-estimate equation (1). The results are reported in Table 5. The estimation sample in this case is the twenty largest states of India, excluding Jammu and Kashmir. The relationship between lagged sexual assaults and labor supply is very similar to before (as reported in Tables 3a and 3b). The coefficient on lagged sexual assault reports for the rural estimation sample is slightly larger for all three labor supply measures.

As a further robustness check and to compare how the estimation results compare with those of men, I use an alternative definition of labor supply. Instead of a binary variable for whether or not a married female is employed outside the home, I use the fraction of the last seven days which were spent in regular salaried or casual work. This measure of labor supply varies continuously between zero and one. I then re-estimate equation (1) using this alternative measure, for both men and women.[19] The results are reported in Table 6, column (I) for married women between the age of twenty five and fifty five who are the spouse of the household head, and column (II) for married men between the age of twenty five and fifty five who are the household head. Lagged sexual assault reports continue to have a statistically

[18] Despite covering a small area, there are as many as 160 cases of sexual assaults and 1200 reports of such cases in Delhi over the time period under study. Only the states of Uttar Pradesh, West Bengal and Maharashtra have higher sexual assault reports, all spread over a much larger number of districts. For reference there are 8 districts in Delhi, compared to 71 in Uttar Pradesh, 19 in West Bengal and 34 in Maharashtra. The number of physical assault incidents and their reports in Delhi is similarly high.

[19] While urban men spent 73% of the past seven days in regular salaried or casual work in 2011-2012 and rural men spent 77% of the past seven days in regular salaried or casual work, the corresponding averages for urban women were 16% and for rural women 23%.

significant and negative effect on female labor supply in both urban and rural households. There is no effect of lagged physical assault reports. For the male sample there is a statistically significant *positive* effect, at the 5% level only, of lagged sexual assault reports as well as lagged physical assault reports in urban households, but there is no effect of these reports for married men in rural households.

It is possible that household consumption per capita, as well as the child and education variables in the labor supply equations estimated are endogenous. As a further robustness check, I exclude these variables from equation (1), and re-estimate. The results are given in Table 7. The coefficients on lagged sexual assault reports and lagged physical assault reports are slightly larger than before, or compared with Tables 3a and 3b, and remain statistically significant.

I also drop spouse age as well as household consumption per capita, and the child and education variables, then re-estimate equation (1) on a larger sample which includes all married women between the ages of twenty five and fifty five, not just wives of the household head. The results are given in Table 8. The coefficients on lagged sexual assault reports and lagged physical assault reports are slightly smaller in size, but remain negative and statistically significant at the 5% level.

As a final check, I modify the definition of physical violence incidents so that these exclude the more extreme cases of 'torture' and 'kill by physical assault.' I then re-estimate equation (1). The results are given in Table 9. The relationship between lagged sexual assault reports and labor supply remains unchanged from before.

6 Conclusion

I find that the labor force participation of married women in India is reduced following increased media reporting of sexual assaults in one's local area. These effects are found despite ruling out several sources of unobserved heterogeneity, and are robust to a number of checks. The results highlight the importance of addressing safety concerns of women in India. Some interventions which might be adopted include special transport facilities for women, self defence training for women and the strengthening of a policing and legal framework that protects women from sexual assaults.

The benefits of increased female labor force participation above and beyond increases in economic output have been documented in a number of studies. Besides increasing overall productivity of the economy (Bloom et al. 2009), increased participation improves women's status within the household (Anderson & Eswaran 2009, Atkin 2009) and delays women's marriage and childbearing decisions (Jensen

2012, Heath & Mobarak 2015). While increased female labor force participation can reduce leisure and potentially increase domestic violence due to a backlash effect, the alternative of low participation rates and high sexual assaults is likely to lead to a cycle of low productivity and low bargaining power of married women within their households. This underscores the importance of implementing changes and adopting interventions that enable women to become productive members of the economy.

7 Tables

TABLE 1a
Descriptive statistics, urban estimation sample

	Round 66	Round 68	Total
Employed in salaried or casual work last week (L^1)	0.1011	0.1028	0.1020
Employed in salaried or casual work last year (L^2)	0.0981	0.0991	0.0986
Self: age	38.7727	38.9450	38.8587
Self: illiterate	0.2531	0.2337	0.2434
Self: less than a primary education	0.0768	0.0831	0.0800
Self: primary education	0.1210	0.1169	0.1189
Self: middle education	0.1659	0.1654	0.1657
Self: secondary education	0.1486	0.1559	0.1522
Self: more than secondary education	0.2346	0.2450	0.2398
Per capita household consumption	2.0196	2.7083	2.3632
Hindu Other Household	0.3030	0.2851	0.2941
SC or ST Household	0.2145	0.2212	0.2179
Hindu OBC Household	0.2947	0.3036	0.2992
Muslim Household	0.1424	0.1486	0.1455
Other Religion Household	0.0453	0.0416	0.0434
Spouse: age	44.0594	44.1661	44.1126
Spouse: illiterate	0.1327	0.1226	0.1277
Spouse: less than a primary education	0.0697	0.0730	0.0714
Spouse: primary education	0.1036	0.1003	0.1020
Spouse: middle education	0.1629	0.1683	0.1656
Spouse: secondary education	0.1730	0.1651	0.1691
Spouse: more than secondary education	0.3579	0.3706	0.3642
Number of children younger than 2	0.1152	0.1083	0.1118
Number of children age 3 and 4	0.1331	0.1166	0.1249
Number of children age 5 to 10	0.5507	0.5303	0.5405
Observations	26341	26230	52571

Notes: Each cell gives the average value of a variable in the respective sub-sample.
Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age in urban households.

TABLE 1b

Descriptive statistics, rural estimation sample

	Round 66	Round 68	Total
Employed in salaried or casual work last week (L^1)	0.1228	0.1188	0.1208
Employed in salaried or casual work last year (L^2)	0.1197	0.1048	0.1122
Self: age	38.9780	39.1665	39.0730
Self: illiterate	0.4611	0.4362	0.4485
Self: less than a primary education	0.1135	0.1223	0.1179
Self: primary education	0.1463	0.1385	0.1423
Self: middle education	0.1408	0.1454	0.1431
Self: secondary education	0.0805	0.0847	0.0826
Self: more than secondary education	0.0579	0.0729	0.0655
Per capita household consumption	1.4244	1.8701	1.6491
Hindu Other Household	0.1763	0.1777	0.1770
SC or ST Household	0.3518	0.3424	0.3470
Hindu OBC Household	0.3321	0.3336	0.3329
Muslim Household	0.1079	0.1166	0.1123
Other Religion Household	0.0320	0.0296	0.0308
Spouse: age	44.1021	44.2530	44.1782
Spouse: illiterate	0.2513	0.2358	0.2435
Spouse: less than a primary education	0.1125	0.1244	0.1185
Spouse: primary education	0.1571	0.1463	0.1516
Spouse: middle education	0.1843	0.1827	0.1835
Spouse: secondary education	0.1370	0.1398	0.1384
Spouse: more than secondary education	0.1579	0.1709	0.1645
Number of children younger than 2	0.1196	0.1066	0.1131
Number of children age 3 and 4	0.1553	0.1334	0.1443
Number of children age 5 to 10	0.6309	0.6015	0.6161
Observations	40021	40685	80706

Notes: Each cell gives the average value of a variable in the respective sub-sample.
Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age in rural households.

TABLE 2

Descriptive statistics, assault incidents and reports

	Round 66	Round 68	Total
Panel A: Urban estimation sample			
Incidents of physical assaults in own district, previous quarter	2.7123	2.7388	2.7255
	(8.5570)	(9.5317)	(9.0564)
Reports of physical assaults in own district, previous quarter	18.0222	18.7415	18.3811
	(66.0617)	(71.8421)	(69.0066)
Incidents of sexual assaults in own district, previous quarter	1.5428	1.8866	1.7143
	(8.2767)	(8.6014)	(8.4419)
Reports of sexual assaults in own district, previous quarter	10.3370	11.6479	10.9911
	(59.3312)	(60.2208)	(59.7797)
Observations	26341	26230	52571
	Round 66	Round 68	Total
Panel B: Rural estimation sample			
Incidents of physical assaults in own district, previous quarter	0.7403	0.7455	0.7429
	(2.7363)	(2.2862)	(2.5195)
Reports of physical assaults in own district, previous quarter	4.2583	4.6981	4.4800
	(17.9342)	(16.7824)	(17.3644)
Incidents of sexual assaults in own district, previous quarter	0.2840	0.4500	0.3677
	(1.2859)	(1.9059)	(1.6303)
Reports of sexual assaults in own district, previous quarter	1.8701	2.8243	2.3511
	(10.3365)	(13.5941)	(12.0983)
Observations	40021	40685	80706

Notes: Each cell gives the average value of a variable in the respective sub-sample, with the standard deviation given in parentheses.

Source: Data on incidents and reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT), aggregated at the district level and matched with individual level NSS data; see sub-section 4.2 for details.

TABLE 3a

Labor supply of married urban women

	(I)	(II)	(III)
Reports of physical assaults in own district, previous quarter	–0.00001	–0.00000	–0.00001
	(0.00004)	(0.00004)	(0.00004)
Reports of sexual assaults in own district, previous quarter	–0.00006***	–0.00006***	–0.00006***
	(0.00002)	(0.00002)	(0.00002)
Per capita household consumption	–0.00219**	–0.00143	0.00069
	(0.00093)	(0.00093)	(0.00115)
SC or ST Household	0.06773***	0.06457***	0.05822***
	(0.00551)	(0.00563)	(0.00580)
Hindu OBC Household	0.01075***	0.00844*	0.01230***
	(0.00406)	(0.00404)	(0.00431)
Muslim Household	–0.04247***	–0.04359***	–0.05212***
	(0.00573)	(0.00556)	(0.00592)
Other Religion Household	0.01920*	0.02039**	0.01904*
	(0.00919)	(0.00889)	(0.00869)
Spouse: less than a primary education	–0.03519***	–0.03655***	–0.03451***
	(0.00698)	(0.00691)	(0.00746)
Spouse: primary education	–0.05985***	–0.05933***	–0.05651***
	(0.00627)	(0.00632)	(0.00710)
Spouse: middle education	–0.08763***	–0.08580***	–0.07983***
	(0.00634)	(0.00617)	(0.00686)
Spouse: secondary education	–0.10778***	–0.10520***	–0.10307***
	(0.00681)	(0.00687)	(0.00766)
Spouse: more than secondary education	–0.10561***	–0.10271***	–0.10871***
	(0.00697)	(0.00702)	(0.00790)
Number of children younger than 2	–0.01816***	–0.01913***	–0.02403***
	(0.00425)	(0.00406)	(0.00427)
Number of children age 3 and 4	–0.00570	–0.00644	–0.00781
	(0.00453)	(0.00440)	(0.00472)
Number of children age 5 to 10	0.00441*	0.00205	0.00161
	(0.00208)	(0.00198)	(0.00205)
Self: less than a primary education	–0.01700***	–0.01985***	–0.01684***
	(0.00564)	(0.00551)	(0.00608)
Self: primary education	–0.02384***	–0.02369***	–0.01785***
	(0.00547)	(0.00524)	(0.00551)
Self: middle education	–0.04146***	–0.04138***	–0.03731***
	(0.00601)	(0.00594)	(0.00561)
Self: secondary education	–0.02760***	–0.02755***	–0.02574***
	(0.00558)	(0.00551)	(0.00594)
Self: more than secondary education	0.09889***	0.09942***	0.10231***
	(0.00734)	(0.00731)	(0.00782)
N	52571	52571	51637

Notes: Results reported from estimating equation (1) in section 3. Different measures of labor supply are used as the dependent variable across columns; L^1 for column (I), L^2 for column (II) and L^3 for column (III). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age in urban households. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 3b

Labor supply of married rural women

	(I)	(II)	(III)
Reports of physical assaults in own district, previous quarter	0.00020	0.00018	–0.00020
	(0.00014)	(0.00011)	(0.00011)
Reports of sexual assaults in own district, previous quarter	–0.00019**	–0.00023**	–0.00025*
	(0.00008)	(0.00009)	(0.00011)
Per capita household consumption	–0.01347***	–0.01159***	–0.00139
	(0.00178)	(0.00172)	(0.00169)
SC or ST Household	0.07402***	0.07640***	0.04938***
	(0.00606)	(0.00656)	(0.00559)
Hindu OBC Household	0.02117***	0.02157***	0.02029***
	(0.00510)	(0.00547)	(0.00524)
Muslim Household	–0.01021	–0.00787	–0.02997***
	(0.00576)	(0.00588)	(0.00628)
Other Religion Household	0.02369**	0.03025***	0.01878
	(0.01046)	(0.01050)	(0.01011)
Spouse: less than a primary education	–0.02560***	–0.02997***	–0.01663***
	(0.00505)	(0.00541)	(0.00533)
Spouse: primary education	–0.04221***	–0.04687***	–0.03071***
	(0.00483)	(0.00473)	(0.00496)
Spouse: middle education	–0.05291***	–0.06165***	–0.04341***
	(0.00475)	(0.00494)	(0.00515)
Spouse: secondary education	–0.07637***	–0.07765***	–0.06302***
	(0.00527)	(0.00535)	(0.00583)
Spouse: more than secondary education	–0.08674***	–0.08876***	–0.08934***
	(0.00553)	(0.00566)	(0.00669)
Number of children younger than 2	–0.02626***	–0.02350***	–0.02559***
	(0.00398)	(0.00368)	(0.00403)
Number of children age 3 and 4	–0.00091	–0.00387	–0.00358
	(0.00328)	(0.00316)	(0.00351)
Number of children age 5 to 10	0.00646***	0.00364**	0.00382*
	(0.00164)	(0.00149)	(0.00173)
Self: less than a primary education	–0.01350***	–0.01386***	–0.02556***
	(0.00443)	(0.00415)	(0.00498)
Self: primary education	–0.01368***	–0.01702***	–0.02036***
	(0.00409)	(0.00388)	(0.00443)
Self: middle education	–0.02453***	–0.02270***	–0.02413***
	(0.00489)	(0.00491)	(0.00536)
Self: secondary education	–0.00011	0.00203	–0.00485
	(0.00692)	(0.00692)	(0.00702)
Self: more than secondary education	0.13302***	0.13765***	0.11590***
	(0.00976)	(0.00977)	(0.00952)
N	80706	80706	72220

Notes: Results reported from estimating equation (1) in section 3. Different measures of labor supply are used as the dependent variable across columns; L^1 for column (I), L^2 for column (II) and L^3 for column (III). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age in rural households. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 4a

Heterogeneity in effect of violence on labor supply, by social group

	(I)	(II)	(III)	(IV)	(V)	(VI)
Panel A: Urban estimation sample						
$S_{ds,r-1}$	–0.00010***	–0.00010***	–0.00009***	–0.00005	–0.00006	–0.00009
	(0.00003)	(0.00003)	(0.00003)	(0.00006)	(0.00005)	(0.00005)
$S_{ds,r-1}\times$ high caste Hindu	0.00006***	0.00006***	0.00005			
	(0.00002)	(0.00002)	(0.00003)			
$S_{ds,r-1}\times$ Muslim				–0.00010*	–0.00007	–0.00007
				(0.00005)	(0.00005)	(0.00006)
N	44922	44922	44023	37112	37112	36270
Panel B: Rural estimation sample						
$S_{ds,r-1}$	–0.00027**	–0.00042***	–0.00024	–0.00026**	–0.00036***	–0.00028*
	(0.00011)	(0.00012)	(0.00013)	(0.00012)	(0.00013)	(0.00013)
$S_{ds,r-1}\times$ high caste Hindu	0.00007	0.00030	–0.00020			
	(0.00025)	(0.00024)	(0.00029)			
$S_{ds,r-1}\times$ Muslim				0.00045**	0.00052***	0.00027
				(0.00018)	(0.00015)	(0.00019)
N	71643	71643	63431	66420	66420	59137

Notes: Results reported from estimating equation (2) in section 3. Different measures of labor supply are used as the dependent variable across columns; L^1 for columns (I) and (IV), L^2 for columns (II) and (V), L^3 for columns (III) and (VI). See section 3 for details. The estimation sample in columns (I)-(III) excludes Muslim women, and the estimation sample in columns (IV)-(VI) excludes high caste Hindu women. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age from urban households in Panel A and rural households in Panel B. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 4b

Heterogeneity in effect of violence on labor supply, by education

	(I)	(II)	(III)	(IV)	(V)	(VI)
Panel A: Urban estimation sample						
$S_{ds,r-1}$	–0.00005*	–0.00005*	–0.00005***	–0.00001	–0.00001	–0.00003
	(0.00002)	(0.00002)	(0.00002)	(0.00003)	(0.00003)	(0.00002)
$S_{ds,r-1} \times <$ primary educ	–0.00003	–0.00004	–0.00004			
	(0.00004)	(0.00004)	(0.00004)			
$S_{ds,r-1} \times \geq$ secondary educ				–0.00010***	–0.00009***	–0.00006***
				(0.00003)	(0.00003)	(0.00002)
N	52571	52571	51637	52571	52571	51637
Panel B: Rural estimation sample						
$S_{ds,r-1}$	–0.00017	–0.00022	–0.00036	–0.00020**	–0.00023**	–0.00021*
	(0.00017)	(0.00014)	(0.00019)	(0.00008)	(0.00009)	(0.00010)
$S_{ds,r-1} \times <$ primary educ	–0.00004	–0.00002	0.00019			
	(0.00024)	(0.00019)	(0.00023)			
$S_{ds,r-1} \times \geq$ secondary educ				0.00008	0.00002	–0.00026
				(0.00028)	(0.00024)	(0.00033)
N	80706	80706	72220	80706	80706	72220

Notes: Results reported from estimating equation (2) in section 3. Different measures of labor supply are used as the dependent variable across columns; L^1 for columns (I) and (IV), L^2 for columns (II) and (V), L^3 for columns (III) and (VI). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age from urban households in Panel A and rural households in Panel B. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 4c

Heterogeneity in effect of violence on labor supply, by age group

	(I)	(II)	(III)	(IV)	(V)	(VI)
Panel A: Urban estimation sample						
$S_{ds,r-1}$	–0.00006**	–0.00006***	–0.00006***	–0.00005	–0.00005	–0.00004
	(0.00002)	(0.00002)	(0.00002)	(0.00003)	(0.00003)	(0.00002)
$S_{ds,r-1}\times$ age 25 to 34	–0.00001	–0.00000	–0.00000			
	(0.00002)	(0.00002)	(0.00002)			
$S_{ds,r-1}\times$ age 45 to 55				–0.00003	–0.00003	–0.00006**
				(0.00003)	(0.00003)	(0.00002)
N	52571	52571	51637	52571	52571	51637
Panel B: Rural estimation sample						
$S_{ds,r-1}$	–0.00016	–0.00016	–0.00026*	–0.00027***	–0.00032***	–0.00028**
	(0.00008)	(0.00009)	(0.00012)	(0.00009)	(0.00009)	(0.00012)
$S_{ds,r-1}\times$ age 25 to 34	–0.00010	–0.00021	0.00002			
	(0.00013)	(0.00013)	(0.00015)			
$S_{ds,r-1}\times$ age 45 to 55				0.00029**	0.00030**	0.00009
				(0.00012)	(0.00012)	(0.00013)
N	80706	80706	72220	80706	80706	72220

Notes: Results reported from estimating equation (2) in section 3. Different measures of labor supply are used as the dependent variable across columns; L^1 for columns (I) and (IV), L^2 for columns (II) and (V), L^3 for columns (III) and (VI). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age from urban households in Panel A and rural households in Panel B. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 5

Robustness check, smaller sample

	(I)	(II)	(III)
Panel A: Urban estimation sample			
Reports of physical assaults in own district, previous quarter	0.00000	0.00001	–0.00001
	(0.00004)	(0.00004)	(0.00004)
Reports of sexual assaults in own district, previous quarter	–0.00006**	–0.00006***	–0.00006***
	(0.00002)	(0.00002)	(0.00002)
N	42453	42453	41755
Panel B: Rural estimation sample			
Reports of physical assaults in own district, previous quarter	0.00021	0.00020	–0.00019
	(0.00015)	(0.00012)	(0.00012)
Reports of sexual assaults in own district, previous quarter	–0.00023***	–0.00028***	–0.00030**
	(0.00009)	(0.00010)	(0.00012)
N	67470	67470	60070

Notes: Results reported from estimating equation (1) in section 3. Different measures of labor supply are used as the dependent variable across columns; L^1 for column (I), L^2 for column (II) and L^3 for column (III). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age in the twenty largest Indian states excluding Jammu and Kashmir. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 6

Robustness check, labor supply of married women and men

	(Women)	(Men)
Panel A: Urban estimation sample		
Reports of physical assaults in own district, previous quarter	–0.00000	0.00009*
	(0.00004)	(0.00004)
Reports of sexual assaults in own district, previous quarter	–0.00006***	0.00009*
	(0.00002)	(0.00004)
N	52571	51669
Panel B: Rural estimation sample		
Reports of physical assaults in own district, previous quarter	0.00017	0.00004
	(0.00015)	(0.00014)
Reports of sexual assaults in own district, previous quarter	–0.00020***	–0.00002
	(0.00007)	(0.00023)
N	80706	76492

Notes: Results reported from estimating equation (1) in section 3. The dependent variable is fraction of last week spent in regular or casual work. Column (I) gives the estimation results for married women, and Column (II) gives the estimation results for married men. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head (in Column (I)), or household heads (in Column (II)), who are between 25 and 55 years of age. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 7

Robustness check, excluding household consumption, education and child controls

	(I)	(II)	(III)
Panel A: Urban estimation sample			
Reports of physical assaults in own district, previous quarter	–0.00001	–0.00000	–0.00001
	(0.00004)	(0.00004)	(0.00004)
Reports of sexual assaults in own district, previous quarter	–0.00006***	–0.00007***	–0.00007***
	(0.00002)	(0.00002)	(0.00002)
N	52571	52571	51637
Panel B: Rural estimation sample			
Reports of physical assaults in own district, previous quarter	0.00019	0.00017	–0.00020
	(0.00014)	(0.00011)	(0.00011)
Reports of sexual assaults in own district, previous quarter	–0.00020**	–0.00024***	–0.00027**
	(0.00008)	(0.00009)	(0.00011)
N	80710	80710	72224

Notes: Results reported from estimating equation (1) in section 3; household consumption per capita, own and spouse education as well as number of children in different age groups are excluded as controls. Different measures of labor supply are used as the dependent variable across columns; L^1 for column (I), L^2 for column (II) and L^3 for column (III). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 8

Robustness check, excluding household consumption, spouse and child controls with a larger sample

	(I)	(II)	(III)
Panel A: Urban estimation sample			
Reports of physical assaults in own district, previous quarter	–0.00002	–0.00002	–0.00003
	(0.00003)	(0.00003)	(0.00003)
Reports of sexual assaults in own district, previous quarter	–0.00005***	–0.00005***	–0.00005***
	(0.00002)	(0.00002)	(0.00002)
N	67011	67011	65906
Panel B: Rural estimation sample			
Reports of physical assaults in own district, previous quarter	0.00014	0.00015	–0.00016
	(0.00011)	(0.00009)	(0.00009)
Reports of sexual assaults in own district, previous quarter	–0.00017*	–0.00022***	–0.00033*
	(0.00008)	(0.00009)	(0.00015)
N	105009	105009	94271

Notes: Results reported from estimating equation (1) in section 3; household consumption per capita, education, spouse and child variables are excluded as controls. Different measures of labor supply are used as the dependent variable across columns; L^1 for column (I), L^2 for column (II) and L^3 for column (III). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to married women who are between 25 and 55 years of age. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

TABLE 9

Robustness check, alternative definition of physical assaults

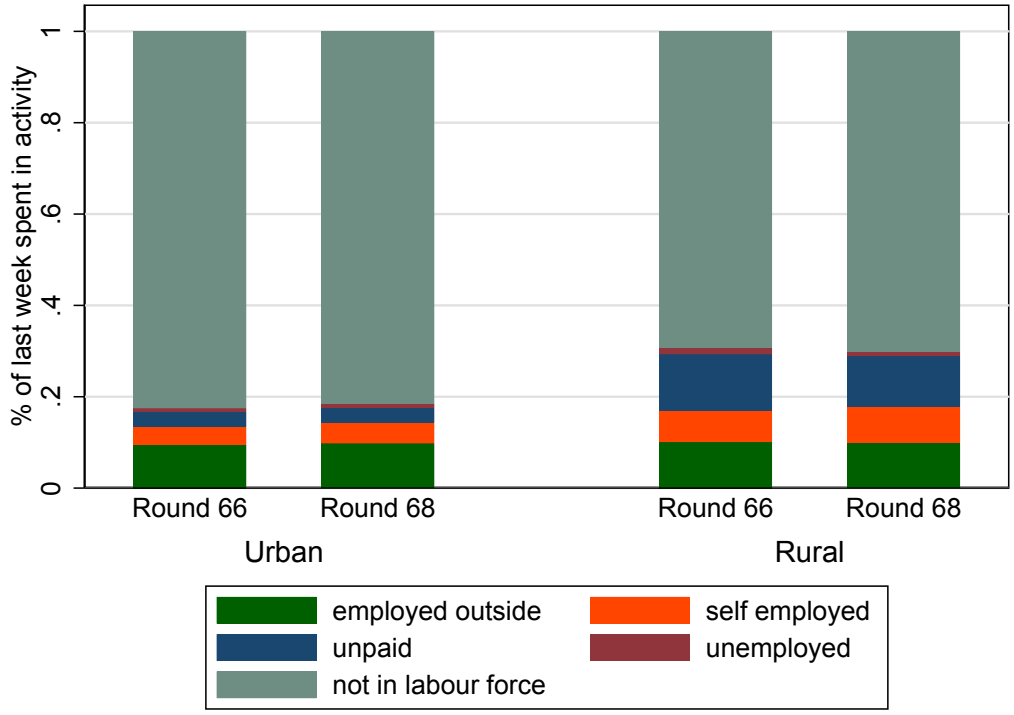
	(I)	(II)	(III)
Panel A: Urban estimation sample			
Reports of physical assaults in own district, previous quarter	–0.00003	–0.00002	–0.00001
	(0.00006)	(0.00006)	(0.00005)
Reports of sexual assaults in own district, previous quarter	–0.00006***	–0.00006***	–0.00006***
	(0.00002)	(0.00002)	(0.00002)
N	52571	52571	51637
Panel B: Rural estimation sample			
Reports of physical assaults in own district, previous quarter	0.00018	0.00016	–0.00022
	(0.00017)	(0.00013)	(0.00013)
Reports of sexual assaults in own district, previous quarter	–0.00019**	–0.00023**	–0.00025**
	(0.00008)	(0.00009)	(0.00011)
N	80706	80706	72220

Notes: Results reported from estimating equation (1) in section 3. Different measures of labor supply are used as the dependent variable across columns; L^1 for column (I), L^2 for column (II) and L^3 for column (III). See section 3 for details. Standard errors are clustered at the district level, and reported in parentheses; * p-value < 0.05, ** p-value < 0.025, *** p-value < 0.01.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample restricted to wives of the household head who are between 25 and 55 years of age. Data on reports of assaults is extracted from the Global Database of Events, Language, and Tone (GDELT).

8 Figures

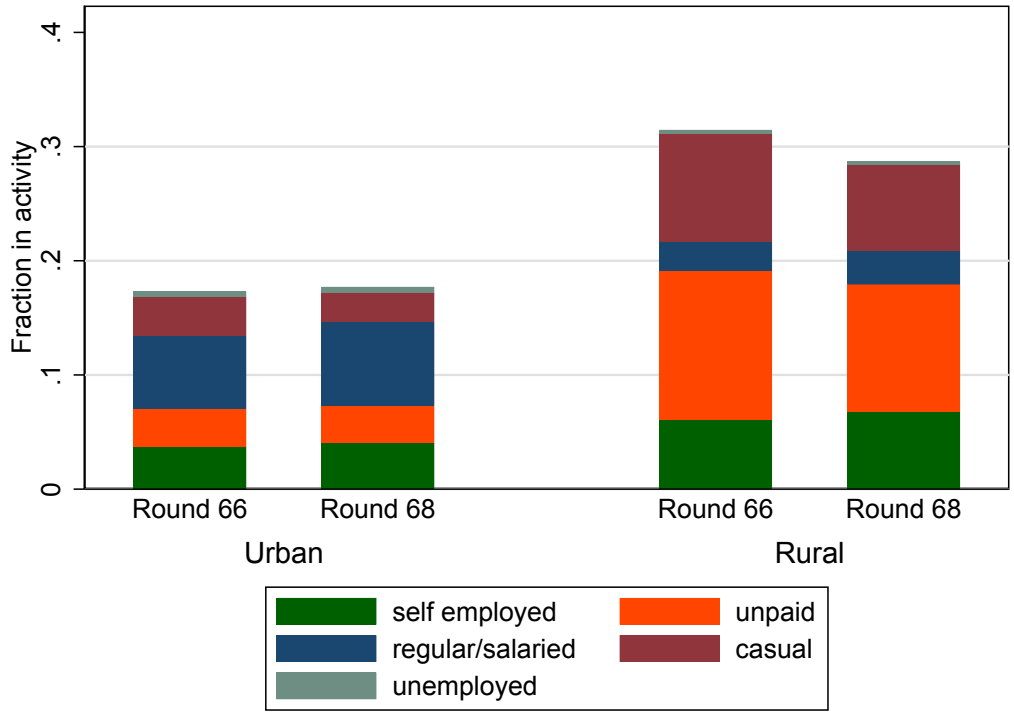
Figure 1
Time allocation of married women in the past week



Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Sample is restricted to wives of the household head who are between 25 and 55 years of age.

Figure 2

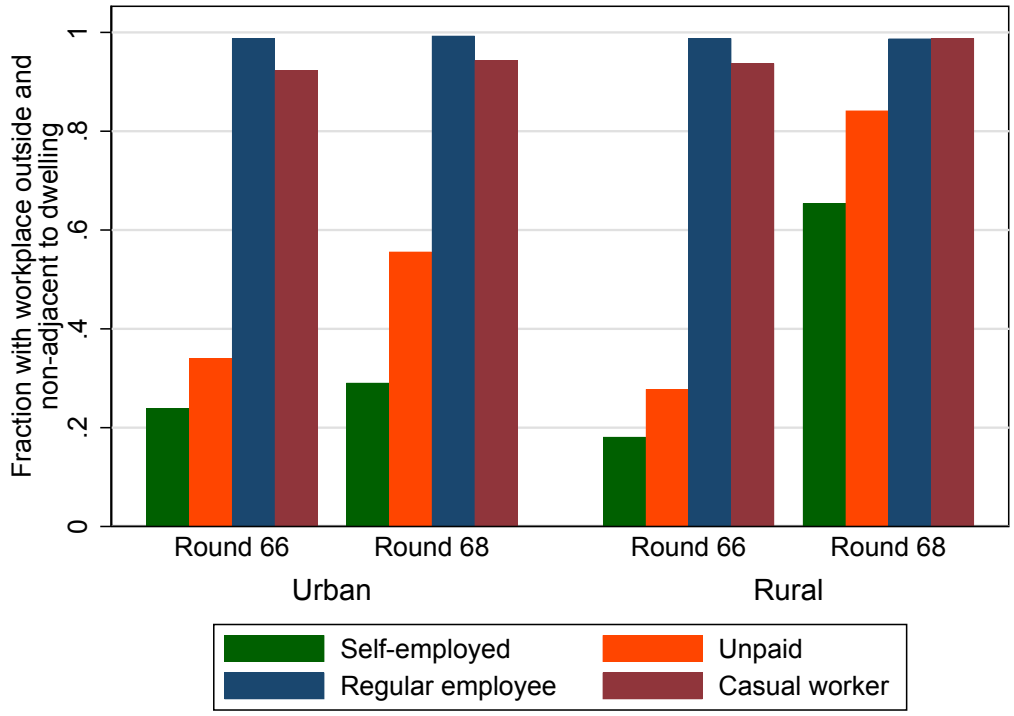
Type of work undertaken by married women based on activity status over the last year



Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Sample is restricted to wives of the household head who are between 25 and 55 years of age.

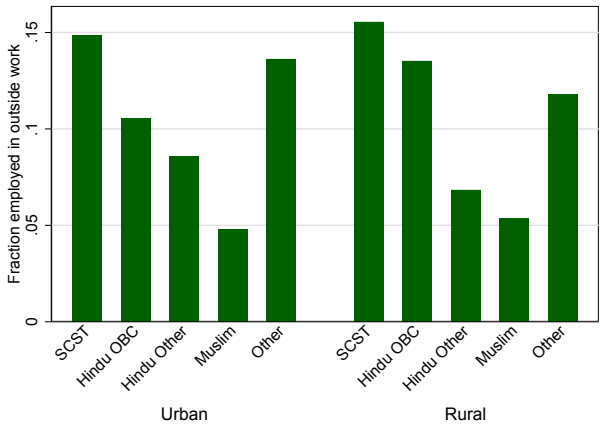
Figure 3

Location of workplace by type of work undertaken by married women

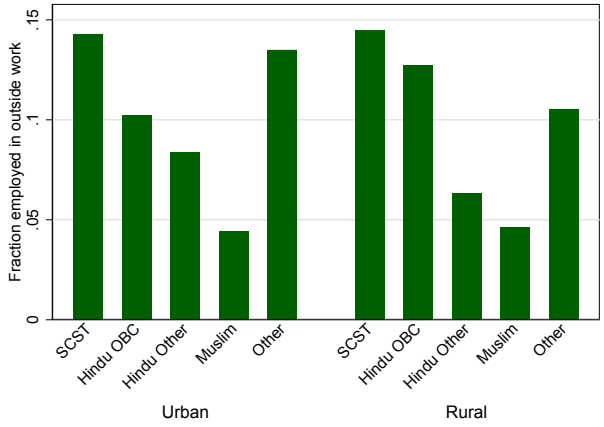


Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Sample is restricted to wives of the household head who are between 25 and 55 years of age.

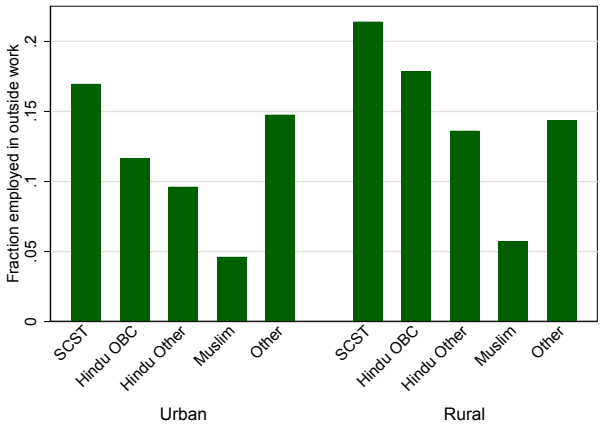
Figure 4
Labour supply of married women by social group



(a) Employment based on activity status over the past week



(b) Employment based on activity status over the past year

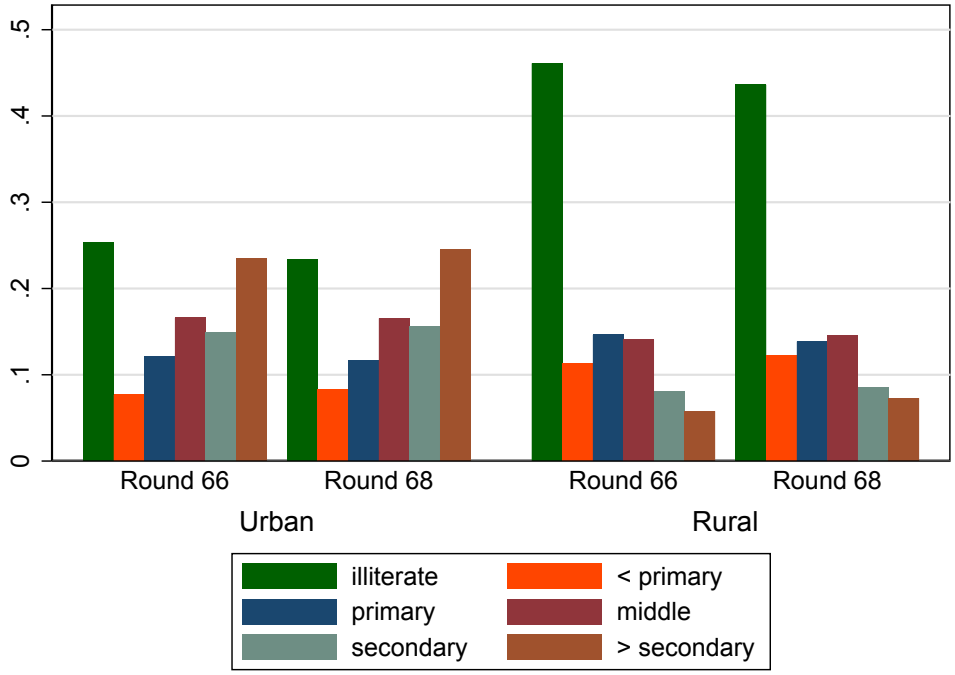


(c) Employment based on activity status over the past year and location

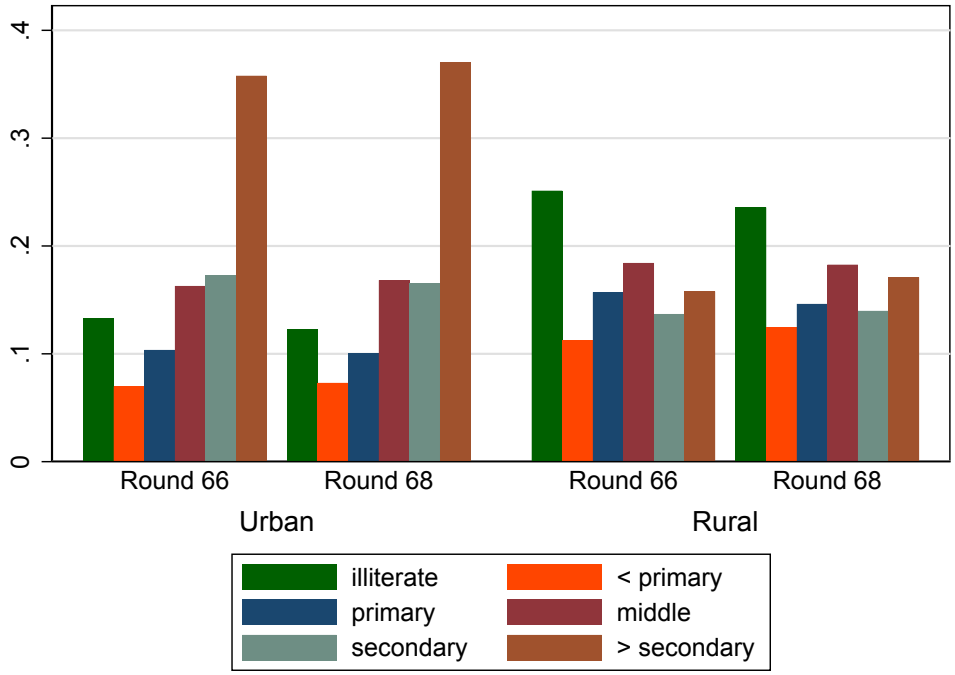
Notes: SCST refers to married women belonging to Scheduled Caste or Scheduled Tribe households. Hindu OBC refers to married women belonging to Hindu Other Backward Caste households. Hindu Other refers to married women belonging to non-SCST, non-OBC (primarily high caste) Hindu households. Muslim refers to married women belonging to Muslim households. Other refers to married women belonging to Christian, Sikh, Jain, Buddhist, Zoroastrian or Other religion households.

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample is restricted to wives of the household head who are between 25 and 55 years of age.

Figure 5
Education distributions



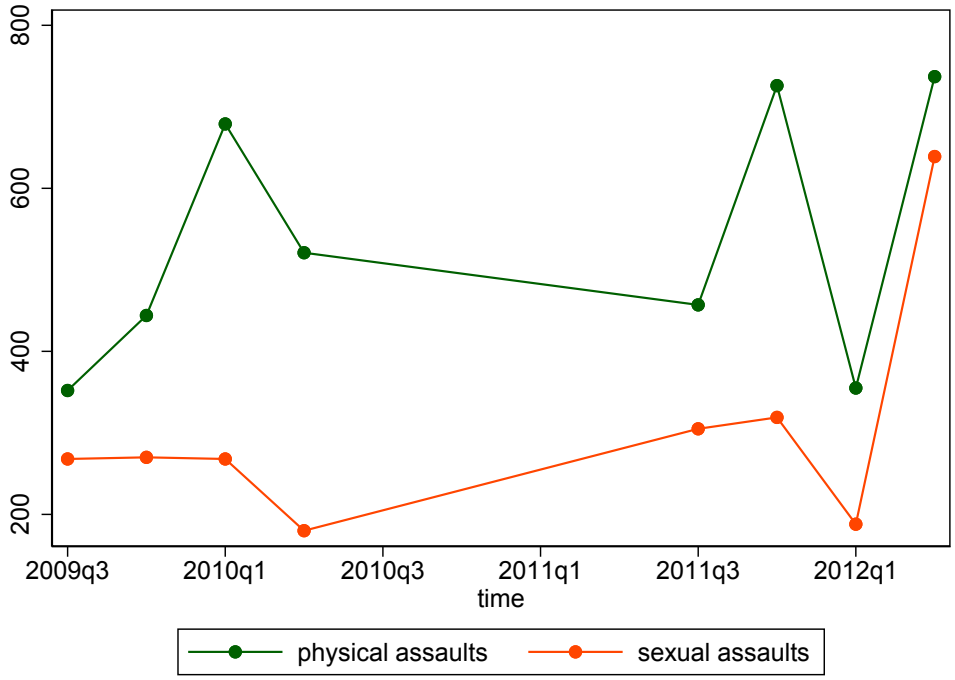
(a) Education of married women (wives of household heads)



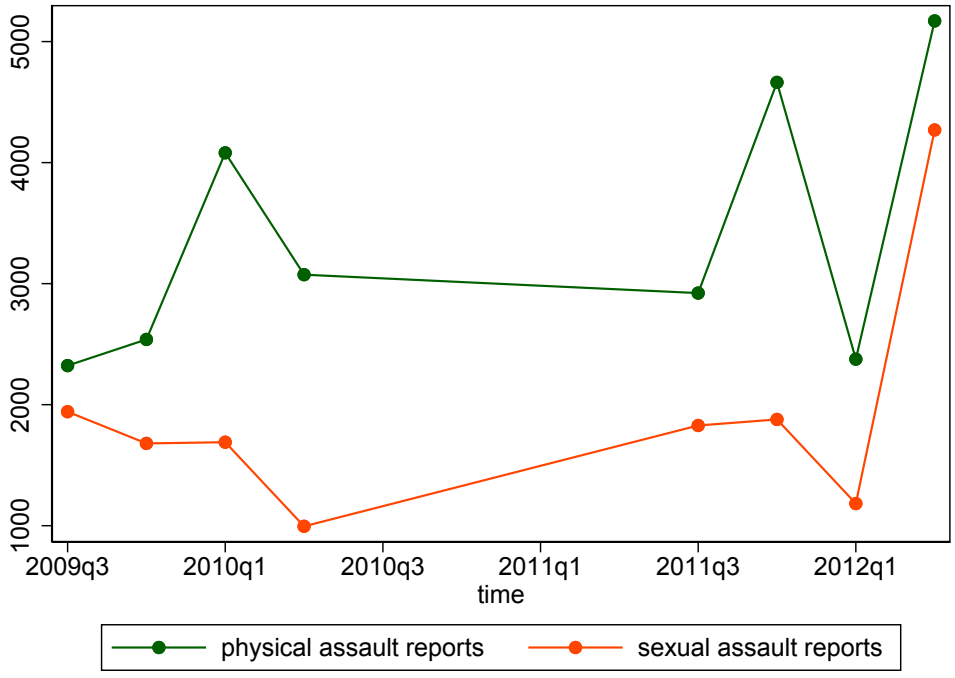
(b) Education of spouses of married women (household heads)

Source: Data from Rounds 66 (2009-10) and 68 (2011-12) of the Employment and Unemployment schedules, Indian National Sample Survey. Estimation sample is restricted to wives of the household head who are between 25 and 55 years of age.

Figure 6
Media reporting of assaults over time



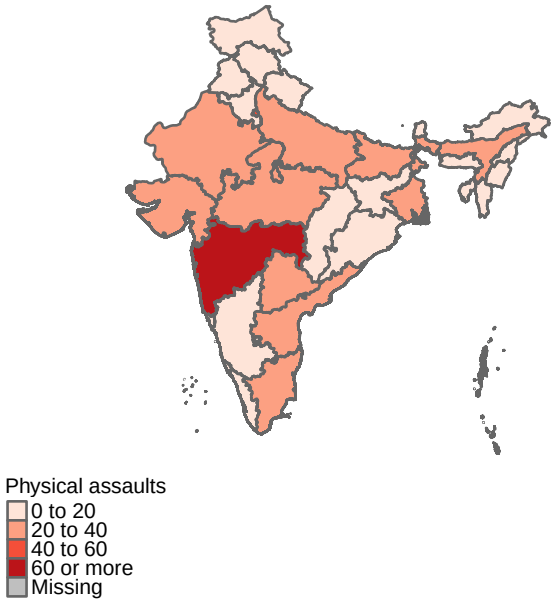
(a) Incidents of physical and sexual assaults



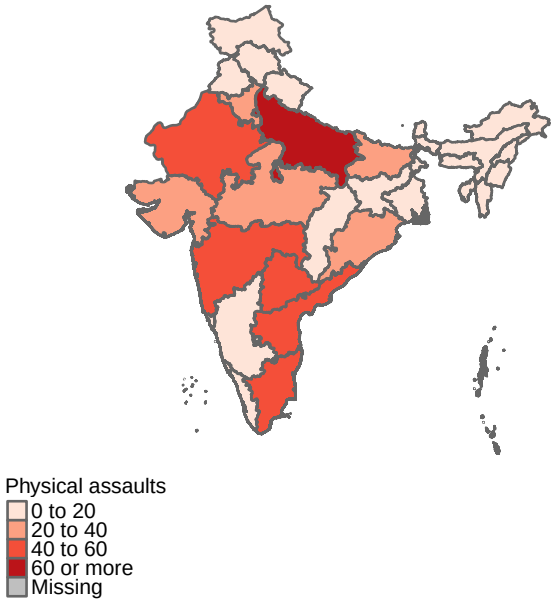
(b) Reports of physical and sexual assaults

Source: Data on incidents and reports of assaults is extracted from the Global Database of Events, Language and Tone (GDELT), aggregated at the district level and matched with individual level NSS data.

Figure 7
Incidents of physical assaults across states



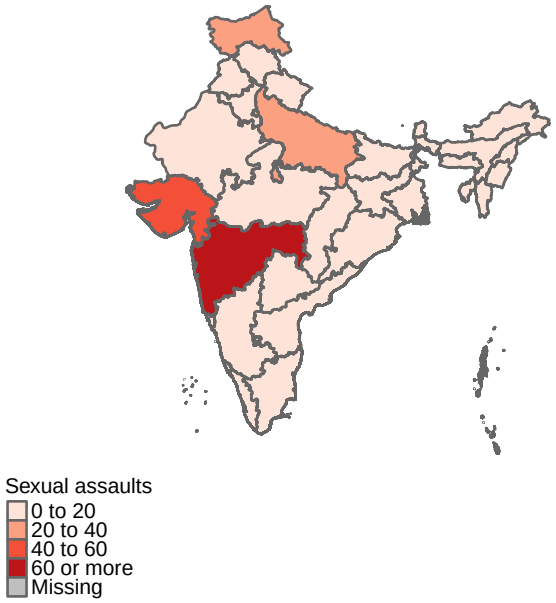
(a) April 2009 to March 2010



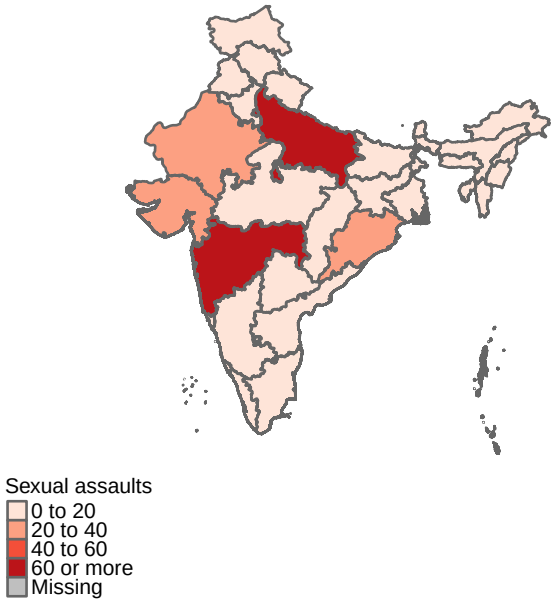
(b) April 2011 to March 2012

Source: Data on incidents and reports of assaults is extracted from the Global Database of Events, Language and Tone (GDELT).

Figure 8
Incidents of sexual assaults across states



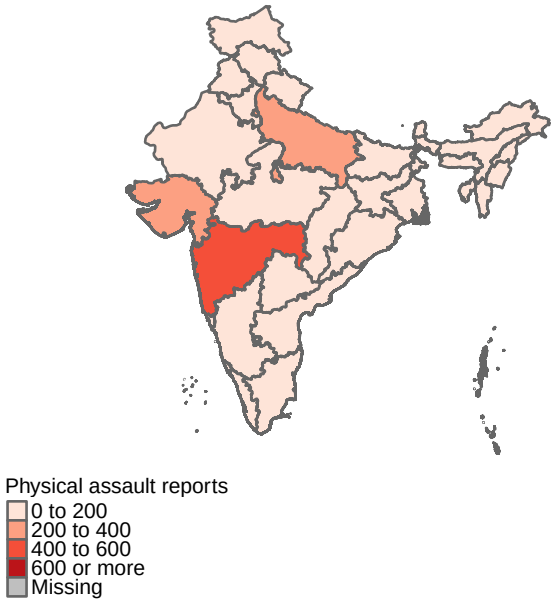
(a) April 2009 to March 2010



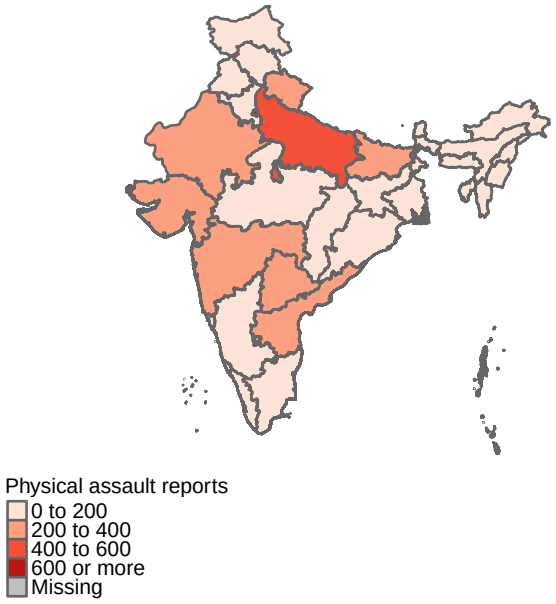
(b) April 2011 to March 2012

Source: Data on incidents and reports of assaults is extracted from the Global Database of Events, Language and Tone (GDELT).

Figure 9
Media reports of physical assaults across states



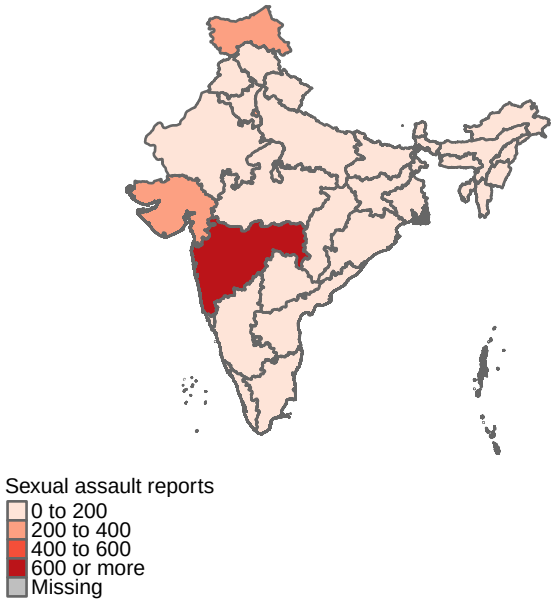
(a) April 2009 to March 2010



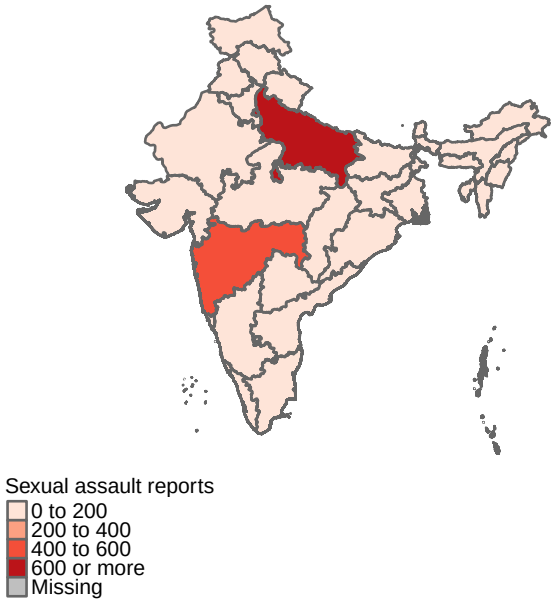
(b) April 2011 to March 2012

Source: Data on incidents and reports of assaults is extracted from the Global Database of Events, Language and Tone (GDELT).

Figure 10
Media reports of sexual assaults across states



(a) April 2009 to March 2010



(b) April 2011 to March 2012

Source: Data on incidents and reports of assaults is extracted from the Global Database of Events, Language and Tone (GDELT).

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