CRIME AGAINST WOMEN IN NORTH AND CENTRAL INDIA: AN ANALYSIS OF FACTORS AFFECTING

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Abstract

The present study is an attempt to find out the factors affecting crime against women (CAW) in Northern and Central Indian states using the technique of multiple regression. The study finds that there is strong impact of good governance in terms of public and judicial security along with socio demographic factors like poverty, unemployment, sex ratio of women, women participation in work force on the incidence of CAW. Higher the female sex ratio lower will be the incidence of CAW. The more participation of women in labour force does not make them safe from CAW. There is strong causal relation between poverty and unemployment of male and the CAW. However, the key determinant for women safety is the provision of judicial and public security by the governance.

Keywords: *Crime against Women, North Indian states, Central Indian states, Factors affecting crime, Crime rate.*

Crimes against women in India have risen to an alarming level in the last two decades. According to the National Crime Records Bureau Reports the incidence of serious crimes against women rose from 237 per day in the year 2001 to 313 per day in the year 2015 (Dang et al, 2017). There has been a surge in crime committed against women in India in the year 2017, by nine percent as compared to 2015 (The Hindu, 23 Oct, 2019). As per the, NCRB Report 2019, total of 378277 cases were reported as crime against women in 2018 which were up from 359849 cases from the previous year that is up by 5.1 percent. Uttar Pradesh with 59445 reported cases is on the top of the list followed by Maharashtra which reported 35497 cases. The states wise data on CAW issued by NRCB makes a fact clear that there is different level of

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vulnerability present in the different states of India. North and Central states of India have always been liable to a large number of crimes and high percentage of crime in India. This group is a heterogeneous one which includes in itself the country capital Delhi, some agrarian states like Punjab, Haryana, Himachal Pradesh and Uttranchal which fall in high per capita income bracket; some laggard states like Bihar, Jharkhand, Chhattisgarh, West Bengal and J&K which fall in low per capita income bracket and some states with large population and large geographical area like Uttar Pradesh, Madhya Pradesh and Rajasthan. The present study attempts to explore the impact of some socio demographic and economic factors affecting the CAW, in India with the help of regression analysis based on the North and Central States of India.

A vast literature including various types of studies and data sets are available on the subject of crime against women in India. Michelle Hackett (2011), reveals a robust inverse relationship between the crime of dowry death and the level of development of a state thus implying a possible link between level of development and other forms of domestic violence. The study finds that the urban-rural disparities in the cruelty data can specifically be explained with a 'gendered resource theory' hypothesis that wife-abuse is more ubiquitous in areas where the level of social development is high and as such gender role is changing rapidly.

Dang, Kulkarni and Gaiha (2017) carries out econometric analysis of the factors associated with huge inter-state variation in crimes against women in India. The study finds that the interplay of factors like affluence of a state, demographics like sex ratio, religion, employment opportunities for women, their literacy level, rural/urban population ratio, size of the pool of potential male perpetrators of such crimes, alcoholism, and the indicators like quality of governance in the state and level of media exposure etc separately or jointly account for rape and other crimes against women.

Using a graph based clustering approach Das and Das (2017) analyzes the behaviour of CAW in India from the year 2001 to 2014. The study assesses the effectiveness of Info map clustering algorithm for finding communities based on crime in different of states in India, thus visualizing and identifying the states more affected by crimes.

Thaikkat Ronakh (2017) discusses the insight of crimes committed against women in each state, the rise or fall in the rate of crime in each state during the period 2001-2015, the relation between the victims and the offender, the age groups of the victims that the criminals target the most.

Devakunchari, Bhowmick et al (2019), uses regression as well as visualization for analyzing the crime patterns over the period from 2002 to 2011 and thus helps predict the possible age group of victims. The study appraises the effectiveness of the present security measures in all the states of the country by finding the frequency of crimes against women in different states.

Data Base and Methodology

The study is based on secondary data as published by National Crimes Record Bureau in its NCRB- Report 2019, Govt. of India, for magnitude and rate of crime against women in India. The data for various factors used in the regression analysis have been taken from different sources. Data related to female sex Ratio at birth, percentage of women in work force, percentage of population below poverty line has been taken from SDG Index India Report 2019, published by Niti Aayog, Government of India. The data of unemployment of male has been taken from RBI Hand Book of Statistics. The judicial and public security index data has been taken from Good Governance Index 2019, posted by PIB, (https://pib.gov.in).

The study makes use of technique of Multiple Regression to measure the relationship between the response variable crime rate by fitting a linear equation to the observed data of some factors deemed to affecting crime.
The population regression line for p explanatory variables $x_1, x_2, \ldots, x_p$ is as follows

$$\mu_y = \beta_0 + \beta_{1x1} + \beta_{2x2} + \ldots + \beta_{px_p}. \quad \ldots\ldots (1)$$

The fitted values $b_0, b_1, \ldots, b_p$ estimate the parameters $\beta_0, \beta_1, \ldots, \beta_p$ of the population regression line. Formally, the model for multiple linear regression, given n observations, is

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$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots \beta_p x_{ip} + \varepsilon_i \text{ for } i = 1,2, \ldots n. \quad \ldots\ldots \quad (2)$$

The goodness of fit is checked by the statistics R square, F value, t values and the p values of the respective variables. The model fitness is also checked by MAPE (Mean absolute percentage error.

$$\text{MAPE} = 1/V \sum_t^V = 1 \; I \; e_t / y_t I \quad \ldots\ldots\ldots (3)$$

The predicted values of the response variables are also calculated.

Section I

The North and Central states of India housed more than fifty percent (57.69) of total female population of the country for the year 2018 and jointly accounted for more than fifty percent of total CAW (Refer Table 1). In the year 2016 the share of these states in total CAW of India, is 57.98 percent; in 2017 it is 57.52 percent and in 2018 it is 58.26 percent which implies that the results obtained in case of these states can be applicable by and large to all Indian states. As far as state wise number of incidence and share in overall CAW is concerned, we can observe that out of the selected states, Uttar Pradesh has the largest number of incidence equal to 59445 cases and the largest share equal to 15.7 percent of CAW in the country. West Bengal, Madhya Pradesh, Rajasthan and Bihar follow with absolute number of crimes as 30394, 28942, 27886, 16920 respectively and share in total crime of India as 8 percent, 7.7 percent, 7.4 percent and 4.5 percent respectively. (Table 1)

However, the most noticeable feature is that Uttar Pradesh, Bihar and Bengal have high magnitude of crime, but these states do not have high rate of crime as these are among the most female populous states of India. The female population is largest in case of Uttar Pradesh (1066 lakh) followed by Bihar (567 lakh), West Bengal(471 lakh), Madhya Pradesh(393 lakh) and Rajasthan (371 lakh). The crime rate per lakh female is drastic in case of Delhi and Haryana. Delhi has the crime rate of 149.6 per lakh females and Haryana has 107.5 per lakh, followed by Rajasthan with 75.1, Madhya

Pradesh with 73.5 and West Bengal with 64.4 as rate of crime per lakh. In case of states like Bihar and Uttar Pradesh attributing the low rate of crime, to low reporting of the crime due to illiteracy and poor social condition of women, cannot be ruled out (Bhandari, 2016).

Table 1
Incidence of Crime against Women in North and Central India

State	2016	2017	2018	Percentage in India	Female Population in Lakh	Crime Rate per lakh female pop.
Jammu & Kashmir	2850	3129	3437	0.9	63.6	54
Himachal Pradesh	1222	1246	1633	0.4	35.8	45.6
Punjab	5105	4820	5302	1.4	140.7	37.7
Haryana	9839	11370	14326	3.8	133.3	107.5
Delhi	15310	13076	13640	3.6	91.2	149.6
Rajasthan	27422	25993	27866	7.4	371.1	75.1
Uttar Pradesh	49262	56011	59445	15.7	1066.8	55.7
Uttarakhand	1588	1944	2817	0.7	54	52.2
Madhya Pradesh	26604	29788	28942	7.7	393.9	73.5
Chhattisgarh	5947	7996	8587	2.3	141.9	60.5
Jharkhand	5453	5911	7083	1.9	180.6	39.2
Bihar	13400	14711	16920	4.5	567.4	29.8
West Bengal	32513	30992	30394	8	471.7	64.4
Aggregate of above states	196515	206987	220392	58.3	3712	…..
All India	338954	359849	378277	100	6434.4	58.8
Percentage share of above states	57.98	57.52	58.26	58.30	57.69	.....

Source: Compiled by author from National Crime Record Bureau Report 2019 and author's calculation

Section II

Many studies mentioned above, have shown the impact of various factors on the crime rate of different states. The present study has picked up five variables, which include socio economic and demographic factors- female sex ratio, participation of female in labour force, unemployment rate of male and percentage of poverty along with index of good governance in the form of judicial and public security index. North and Central states of India are characterized by different features with regard to all of these variables.

Female Sex Ratio: The skewed female sex ratio or relative scarcity of females as compared to men makes them more vulnerable to crimes. In states of Haryana, Delhi, Rajasthan, Utrakhand and Uttar Pradesh sex imbalance is much obvious than other states.

$1H_0$: There is no significant relation between female sex ratio and rate of CAW
$1H_1$: There is significant relation between female sex ratio and rate of CAW

Participation of Women in Labour Force: The share of women in the labour force is an indicator of good position of women in society. In Bihar, Uttar Pradesh and Haryana very less percentage of female is working while in states like Himachal Pradesh, Madhya Pradesh and Chhattisgarh there is high percentage of women in working force.

$2H_0$: There is no relation between percentage of females in working force and the CAW
$2H_1$: There is relation between percentage of females in working force and the CAW

Poverty Level: Poverty can also make the position of women all the more vulnerable. In Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand and Chhattisgarh more than one third population is poor.

$3H_0$: There is no relation between level of poverty and the CAW
$3H_1$: There is relation between level of poverty and the CAW

Unemployment of Male: In the absence of productive employment men often take course to wrong doings against women family members and women in the society. Most of the states selected in the study have large magnitude of male unemployment. In Delhi the rate of unemployment of male is as high as 78 males per thousand males. In West Bengal, Haryana, Uttrakhand, Jammu& Kashmir and Punjab, the rate of male unemployment is high.

$4H_0$: There is no relation between level of unemployment of males and the CAW
$4H_1$: There is relation between level of unemployment of males and the CAW

Judicial and Public Security:

The law and order implementation and good governance in the form of provision of sufficient judicial and public security can act as deterrent in the commission of crime. Bihar, Bengal, Jharkhand, Haryana and Uttar Pradesh have very low index of public and judicial security. However, in Himachal Pradesh, Uttrakhand and Rajasthan this index is high.

$5H_0$: There is no relation between judicial & public security index and the CAW
$5H_1$: There is relation between judicial & public security index and the CAW

Results and Discussion

Log linear regression model has been fitted to the data with state wise rate of crime as dependent variable and the state wise female sex ratio, participation of female in labour force, unemployment rate of male, percentage of poverty and index of good governance in the form of judicial and peace index as independent variables. The model comes out to be fit as 83 percent of variations are being explained by the independent variables (Refer Table2). Table 2 and Table 3 describe the values of descriptive statistics multiple R, R square and standard error, F value and significance of F value and other statistics related to regression and the residuals.

Table 2
Regression Statistics

Multiple R	0.9112
R Square	00.8304
Adjusted R Square	0.7092
Standard Error	17.4579
Observations	13

Table 3
Analysis of Variance

	Regression	Residual	Total
Degrees of Freedom	5	7	12
Sum of Square	10443.7	2133.4	12577.1
Mean Sum of Square	2088.74	304.78	
F Value	6.853		
Significance of F	0.0126		

Table 4
Statistics Summary

Variable	Coefficients	Standard Error	t stat	P-Value	Lower 95 percent limit	Upper 95 percent limit
Intercept	1047.361	270.280	3.875	0.0061	408.251	1686.472
Sex Ratio at birth	-1.183	0.310	-3.819	0.0066	-1.916	-0.451
Participation of Women in Labour force	5.497	1.626	3.381	0.0117	1.653	9.341
Population below poverty line	1.545	0.614	2.514	0.0402	0.092	2.998
Unemployment of Male	1.691	0.354	4.779	0.0020	0.854	2.528
Judicial and Peace Security	-263.874	107.130	-2.463	0.0433	-517.196	-10.552

Source of Table 2, Table 3 and Table 4: The regression model fitted on the observed data

Table 4 shows the coefficients of the independent variables, 't' and 'p' statistics for all coefficients. The p values in case of all the variables comes out to be less than 0.05 ($p \leq 0.05$) so all the null hypotheses $1H_0$, $2H_0$, $3H_0$, $4H_0$, $5H_0$ are rejected in favour of alternative ones. The regression equation thus deduced is as follows.

$$Y=1047.361-1.183\ X_1 + 5.497\ X_2 + 1.545\ X_3 + 1\ .691\ X_4 -263.874\ X_5 \quad .....(4)$$

Findings of the Study

1. The coefficient of sex ratio of female at birth, though not very high has a negative sign, meaning thereby that low sex ratio of females in a state can be socially disastrous and can cause more crime committed against

them; supporting the studies like Dang et al (2017), Kulkarni, Pandey, Gaiha (2013). Lower the sex ratio of females, more vulnerable they will be to crime especially like rape, molestation, kidnapping, abduction and trafficking etc.

2. Ironically, the participation of women in the labour force which otherwise is a sign of stable position of women in society does not affect the CAW negatively, indicating that more participation of women in work force makes them more unsafe and shows the patriarchal negative mind set present in our society.

3. The model shows positive coefficients of poverty and unemployment which implies that poverty level and rate of male unemployment, of an area can be the factor accentuating crime against women. Poverty, unemployment and lack of work drives the male perpetrators to do atrocities on women and crimes like abduction & kidnapping, child abuse, trafficking of girls, domestic violence and dowry death are committed.

4. The coefficient of public and judicial security is negative and very high as compared to other coefficients, giving a clear cut result that more the provision of good governance, less will be the rate of crime. The result is in perfect sync with the studies like Dang et al (2017) and Sen (2015).

Nobel Laureate Sh. Amartya Sen has observed the same for India when he says that.... 'Serious crime against women are closely intertwined with inefficient policing, judicial system and callousness of the society in India. So the quality of governance is a key to understanding the huge variations in incidence of serious crime against women' (Sen, 2015).

Table 5

Observed and Predicted values of Response Variable

State	Actual Value (Crime Rate)	Predicted Values(Crime Rate)
Jammu & Kashmir	54	49.14
Himachal Pradesh	45.6	68.02
Punjab	37.7	37.51
Haryana	107.5	106.46
Delhi	149.6	144.92
Rajasthan	75.1	49.33
Uttar Pradesh	55.7	61.92
Uttarakhand	52.2	66.68
Madhya Pradesh	73.5	61.36
Chhattisgarh	60.5	59.13
Jharkhand	39.2	45.09
Bihar	29.5	45.65
West Bengal	64.4	49.34

Source: NCRB Report 2019 and model fitted by author

Our model predicts the values of dependent variables i.e. crime rate on the basis of equation (4) for different states of North and Central India. The predicted values are quite close to the observed values and the sum of both the predicted and actual values are same. The mean absolute percentage error (MAPE) is 19 percent, not very low but still good enough to explain the variations due to heterogeneity of states features. The model fits most suitably to Haryana, Delhi, Punjab and Chhattisgarh.

Suggestions

From the above analysis the important insight which emerges is suggestive of following points:

1. The incidence of crime against women can be more strongly curbed by provision of public and judicial security rather than mere improvement in typical socio demographic and economic factors like sex ratio of women, unemployment and poverty.
2. The increase in women sex ratio and employment, gender sensitisation, promotion of ethical and moral values all are structural remedies which can be effective in long run; hence a strong dent should be made on the deep rooted patriarchal mind set of the society.

3. The most effective measure is only and only the existence of strong public and judicial security which ensures the removal of culture of impunity of the perpetrators by way of stringent law enforcement mechanism including police, judiciary, administration and government.

References

1. Bhandari, Amit (2016), Don't Report It: How Bihar Fights Crime, www.indiaspend.com
2. Dang Geetika, Vani S. Kulkarni and Raghav Gaiha, (2017), What Factors Affect the Occurrence of Crimes against Women in India? GDI Working paper, 2017-015, Global Development Institute, University of Manchester. (Jul 27)
3. Das Priyanka and Asit Das (2017), Behavioural analysis of crime against women using a graph based clustering approach, Paper presented in International Conference available at www.semanticscholar.org/paper/Behavioural-analysis-of-crime-against-women
4. Devakunchari, Bhowmick S, Bhutada SP, Shishodia Y, (2019), Analysis Of Crimes Against Women In India Using Regression, International Journal of Engineering and Advanced Technology (IJEAT), ISSN: 2249 – 8958, Volume-8, Issue-2S2, January 2019.
5. Good Governance Index 2019, posted by PIB, https://pib.gov.in

6. Kulkarni, Vani. S., Pandey, M.K. & Gaiha, R. (2013) 'MDGs and Gender Inequality', Brooks World Poverty Institute Working Paper, Manchester, 188.
7. Thaikkat Ronakh (2017), Analysis of Crimes Against Women in India between Years 2001 – 2015, International Journal of New Technology and Research (IJNTR) , Volume-3, Issue-4, April, Pages 63-64. www.ijntr.org
8. Michelle Hackett (2011), Domestic Violence against Women: Statistical Analysis of Crimes across India, Journal of Comparative Family Studies, Vol. 42 Issue 2, • January, pp. 267-288.
9. National Crime Record Bureau Report (NRCB), 2019, Govt. of India
10. RBI Hand Book of Statistics, www.rbi.org
11. SDG India Baseline Report 2019, Niti Aayog, Govt. of India
12. Sen, Amartya (2015), The Country of First Boys and other Essays, Oxford University Press.
13. The Hindu, 'Decoding NCRB Report', 23 October, 2019, www.thehindu.com retrieved on 20 January.2020