A Statistical study on crime against women in India

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ABSTRACT

This statistical study examines the prevalence and patterns of crimes against women in India, using data from national crime records and surveys. The study explores the types of crimes, their geographic distribution, and the demographic characteristics of the victims and perpetrators. The findings indicate that crimes against women remain a significant problem in India, with high rates of domestic violence, sexual assault, and female infanticide. The study highlights the need for comprehensive policy and legal reforms, as well as community-based interventions, to address this pressing issue and promote gender equality and women's rights.

INTRODUCTION

Women occupy a vital place in the society. They are considered the first architects and future builders of the society being the first teachers of children. However, women are at the most vulnerable position too all over the world. Crimes against women are spread across space, ethnic and socioeconomic background, educational level, etc. The Report of the Committee on Crime Statistics of India says that globally, up to six out of every ten women experience some kind of physical and/or sexual violence in their lifetime. The Indian culture glorifies women as Devi (goddesses) with immense power. However, they are victims of various types of crimes against women. Though the present status of women changed in last 75 years after independence in India, still the violence and crime do not seem to be decreasing. The women are guaranteed equality under the constitution with legal protection, yet the incidences recorded by government agency show the enormity and severity of crimes against them. There are various factors of crimes, where the crime has also got spatial associations. The UN Declaration on the Elimination of Violence against Women (1993) states that "violence against women is a manifestation of historically unequal power relations between men and women, which have led to domination over and discrimination against women by men and to the prevention of the full advancement of women." It goes on to state that "violence against women is one of the crucial social mechanisms by which women are forced into a subordinate position compared with men. Women in India do not have equal access to autonomy, mobility to outside the home, social freedom, etc. than men. Some of the problems faced by the women are because of their domestic responsibilities , culture and social specified roles, etc. Safety of women matters a lot whether at home , outside the home or work place .[ref 9]

India is the most dangerous country in the world to be a woman because of the high risk of sexual violence. According to the NCRB (NATIONAL CRIME RECORDS BUREAU) of India, reported incidents of crime against women increased 6.4% (dowry related harassment, death, marital rape, wife-battering, sexual abuse, deprivation of healthy food, female genital mutilation, etc.) or outside the family (kidnapping, rape, murder, etc.)

Following are the important crimes against women . [ref. 8]

- Rape (Sec. 376 IPC)
- Kidnapping and abduction (Section 363, 364, 364A, 365, 366 to 369 IPC)
- Dowry death (Sec. 304B IPC)
- Assault on Woman with Intent to Outrage Her Modesty (Sec. 354 IPC)
- Insult to the Modesty of women (Sec. 509 IPC)
- Cruelty by husband (Sec. 498A IPC)
- Importation of girls (Sec. 366 B IPC)
- Immoral traffic
- Indecent representation of women
- Torture
- Sexual harassment
- Female infanticide
- Forced and child marriage
- Acid throwing

METHODOLOGY

Exploratory Data Analysis

The Exploratory data analysis consists of the descriptive properties of data. Here graphical methods are used for preliminary understanding of the data. First and Foremost step in this analysis is study the data in details. One of the main aims of the study is to forecast the crime against women which is recorded more in India. Since the time dependent factors are present in the data, so that the time series technique is adapted to model and forecast the crime against women which is more in India for the upcoming year.

Data Interpretation and Analysis of crimes against women

For this study we use dataset from the NCRB records, where state wise data of crimes against women are available which is used in exploratory data analysis and statistical analysis. In this chapter, analysis of data is presented in two sections, the first one being a graphical exploration of the state wise data of different crimes against women in India and the second section includes statistical analysis of data.[ref 11]

Graphical Exploration of data

Here we present the graphical display of the state wise data of different crimes against women viz, rape, insult to the modesty of women, kidnapping and abduction ,Assault on woman with intent to outrage her modesty , dowry death and cruelty by husbands in India and descriptive statistics of the data.[ref 11]

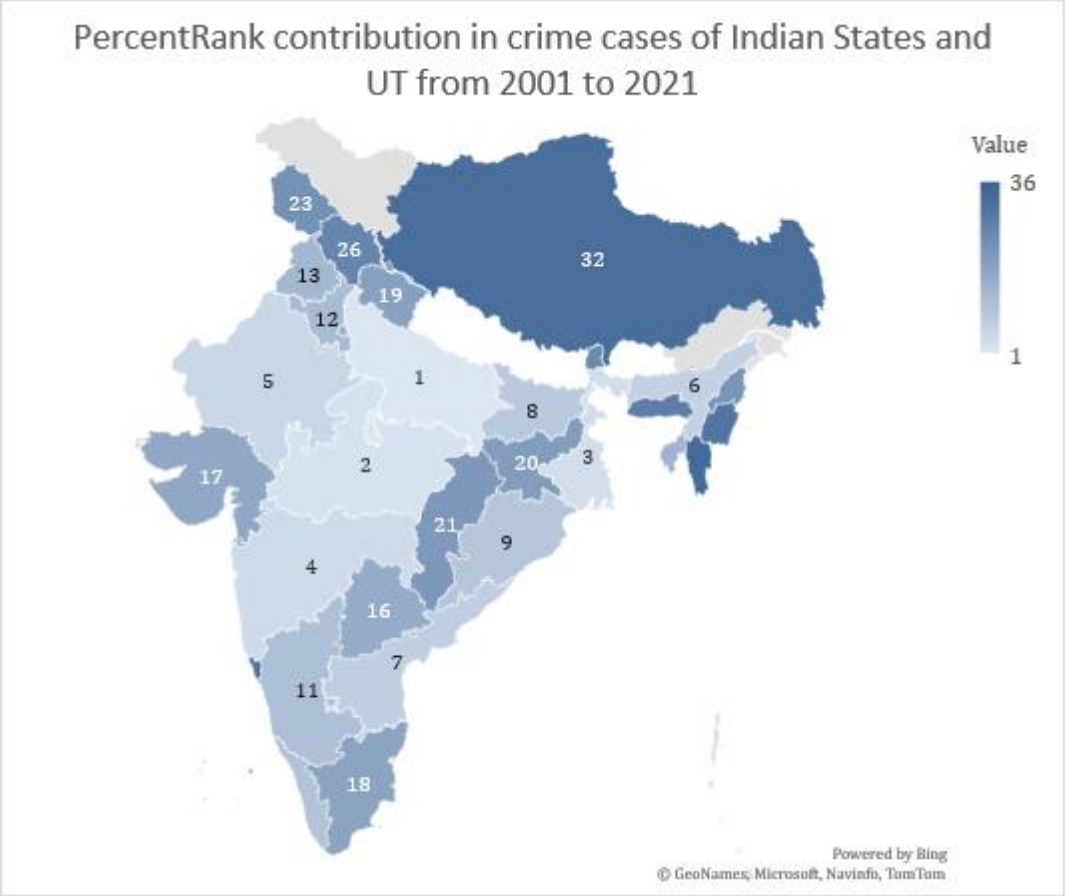

Figure 1 State wise total crimes in India for 22 years.[ref 10]

Shows that Uttar Pradesh stands first among other states of India with respect to the number of total crimes, followed by Madhya Pradesh ,Maharashtra, West Bengal, Rajasthan, and so on. Nagaland has the least percentage of crimes against women in India. The following pie chart shows the percentage-rank of crimes against women in India for the years 2001-2021:

Rape

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
RAPE	36	13	43552	9745.556	10303.64

Table 1: Descriptive Statistics of Rape in India over the year 2001-2021.[ref 3][ref 10]

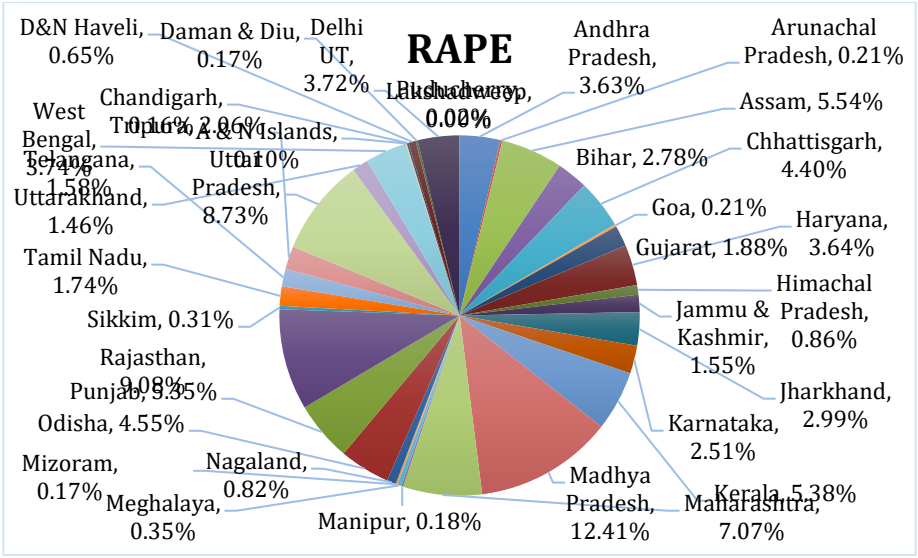

Figure 2: Pie chart of percentage of total number of rapes in India (2001- 2021) [ref 10][ref 11]

From the chart it can be seen that Madhya Pradesh is at the top considering Rape crime

Kidnapping and Abduction Data

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
K&A	36	0	101701	18231.89	21866.58

Table2: Descriptive Statistics of Kidnapping and Abduction Data in India over the year 2001-2021[ref 3][ref 10]

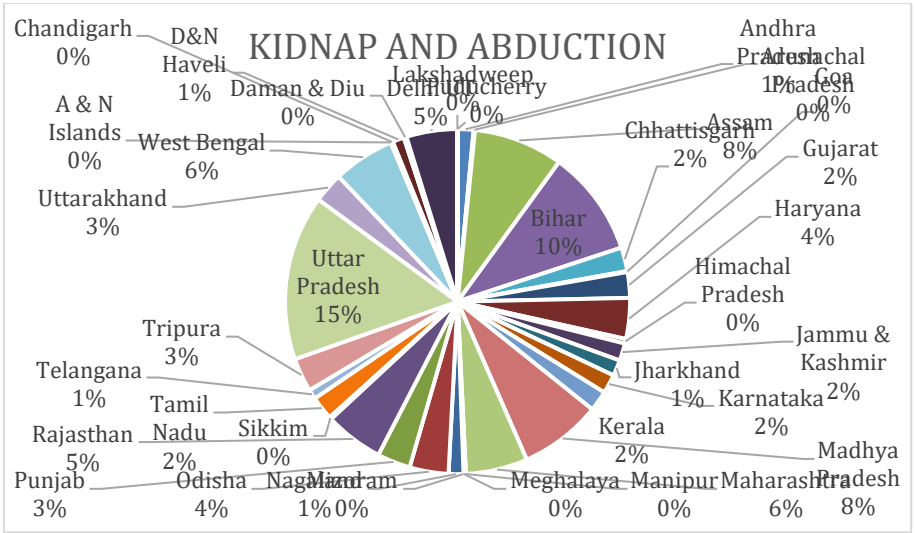

Figure 3: Pie chart of percentage of total number of Kidnapping and Abduction Data in India (2001- 2021) [ref 10][ref 11]

From the chart it can be seen that Uttar Pradesh is at the top considering kidnapping and abduction crime

Dowry deaths

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
DD	36	0	21357	2380.694	4101.104

Table 3: Descriptive Statistics of dowry death in India over the year 2001-2021[ref 3][ref 10]

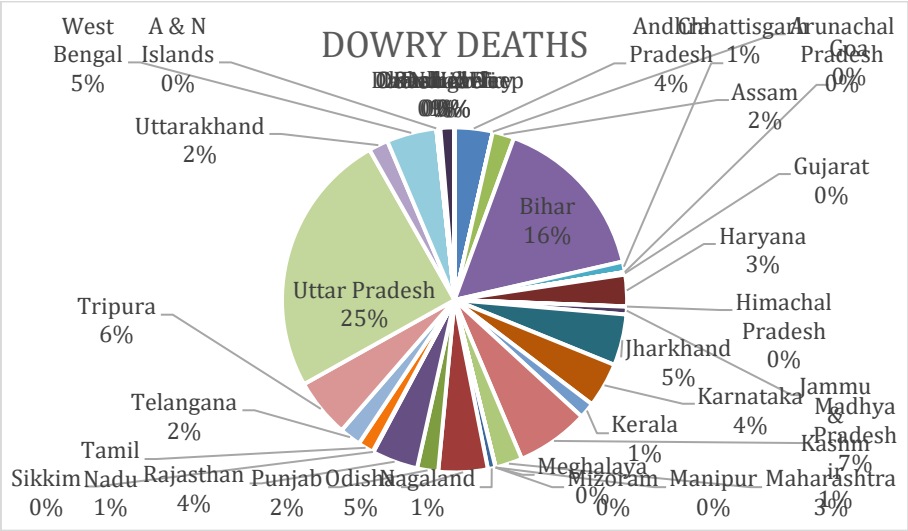

Figure4: Pie chart of percentage of total number of dowry death in India (2001- 2021) [ref 10][ref 11]

From the chart it can be seen that Uttar Pradesh is at the top considering dowry death crime

Assault on Woman with intent to outrage her modesty

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
ASSAULT	36	19	22320.64	22320.64	23830.56

Table 4: Descriptive Statistics of Assault on Woman with intent to outrage her modesty in India over the year 2001-2021[ref 3][ref 10]

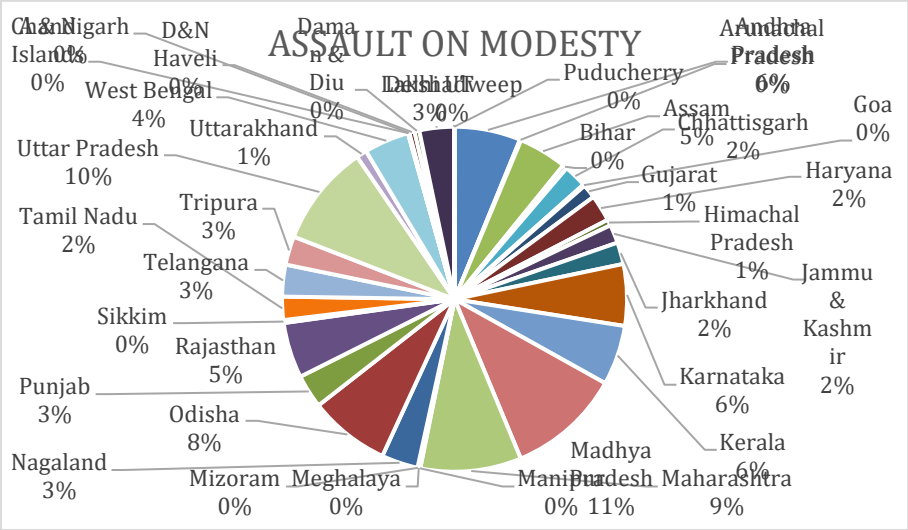

Figure5: Pie chart of percentage of total number of Assault on Woman with intent to outrage her modesty in India (2001- 2021) [ref 10][ref 11]

the pie chart shows that Madhya Pradesh has most no. of cases considering assault to modesty crime

Insult to the modesty of women

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
INSULT TO MODESTY	36	11	25925	3885.833	6218.134

Table 5: Descriptive Statistics of Insult to the modesty of women in India over the year 2001-2021[ref 3][ref 10]

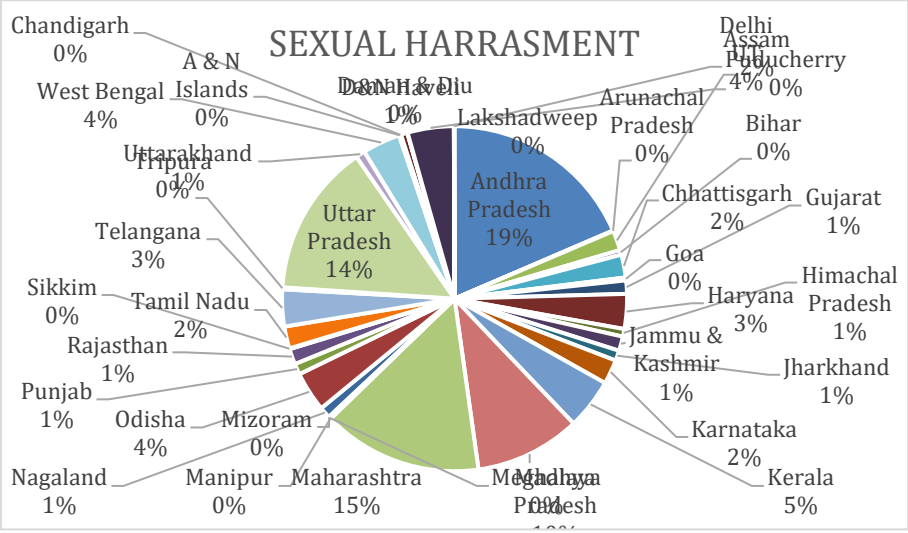

Figure 6: Pie chart of percentage of total number of Insult to the modesty of women in India (2001- 2021) [ref 11][ref 10]

Here Andhra Pradesh is leading the ranks considering sexual harassment crime

Cruelty by husbands or his relatives

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
CRUELTYBY HUSBNAD	36	11	171204	34780.28	41018.83

Table 6: Descriptive Statistics of Cruelty by husbands or his relatives in India over the year 2001-2021[ref 3][ref 10]

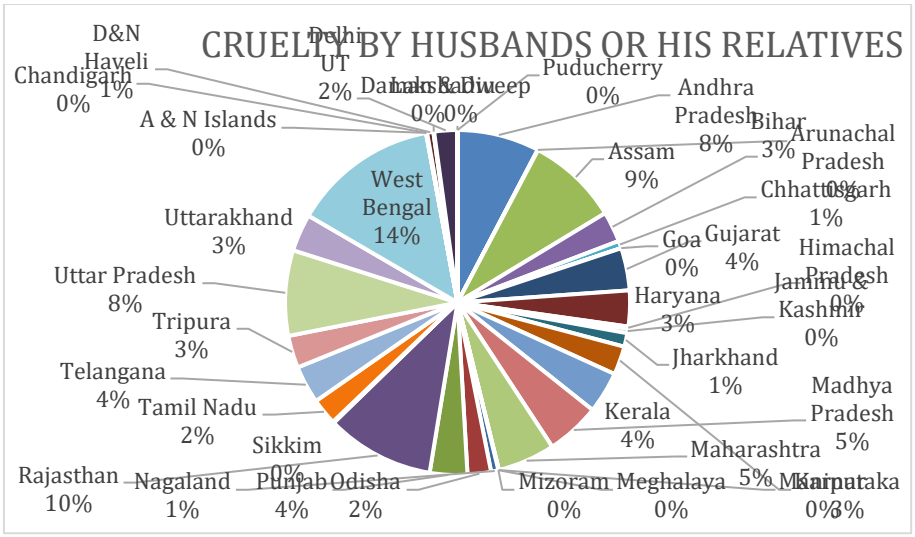

Figure 7: Pie chart of percentage of total number of Cruelty by husbands or his relatives in India (2001- 2021) [ref 10][ref 11]

It is clear from the graph that west Bengal leads the ranks for cruelty by husband factor

Importation of girl from foreign country

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
IMPORT	36	0	583	140.75	165.2858

Table7: Descriptive Statistics of Importation of girl from foreign country in India over the year 2001-2021[ref 3][ref 10]

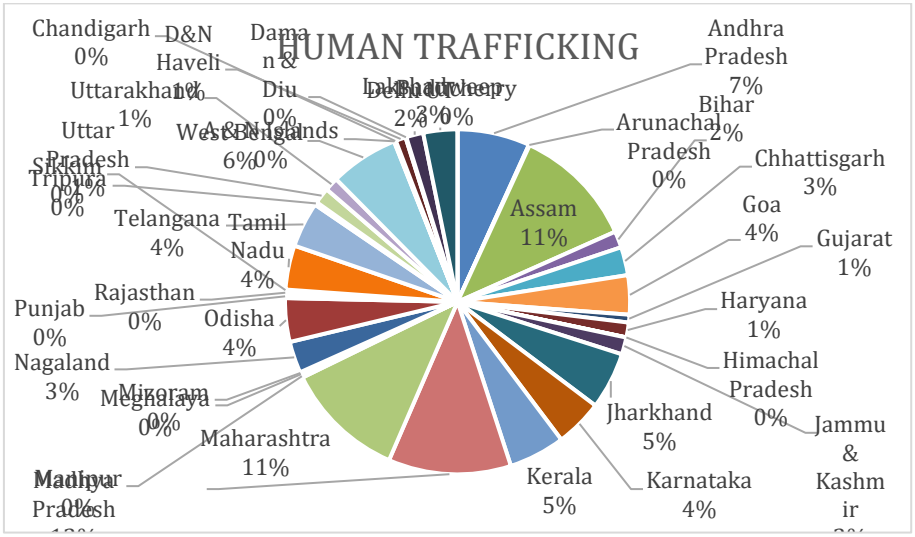

Figure8: Pie chart of percentage of total number of Importation of girl from foreign country in India (2001- 2021) [ref 10][ref 11]

It can be seen from the graph that from Assam most women are imported/exported

Immoral Trafficking

Descriptive statistics

	N	MINIMUM	MAXIMUM	MEAN	STD.DEVIATION
IT	36	0	4026	566.78	916.5392

Table 8: Descriptive Statistics of Immoral trafficking in India over the year 2001-2021[ref 3][ref 10]

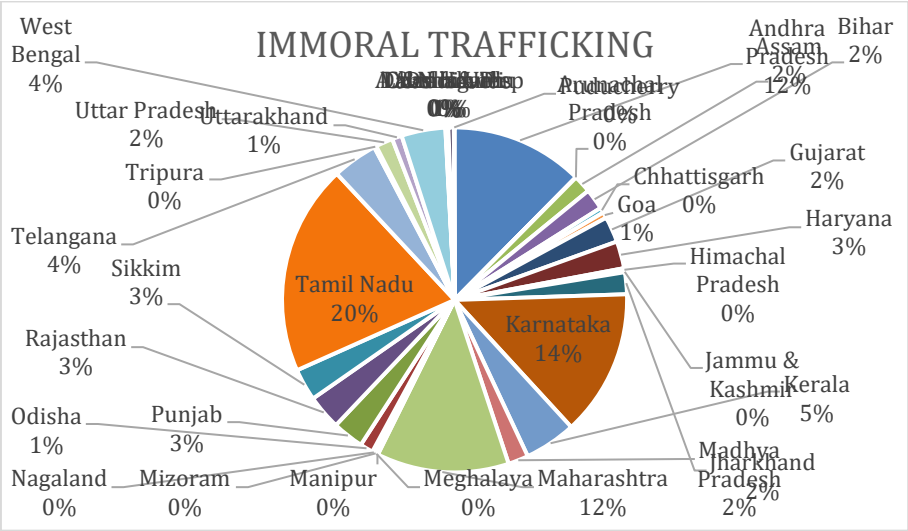

Figure9: Pie chart of percentage of total number of Immoral Trafficking in India (2001-2021) [ref 10][ref 11]

Tamil Nadu imports most women for immoral practices.

Line Graph

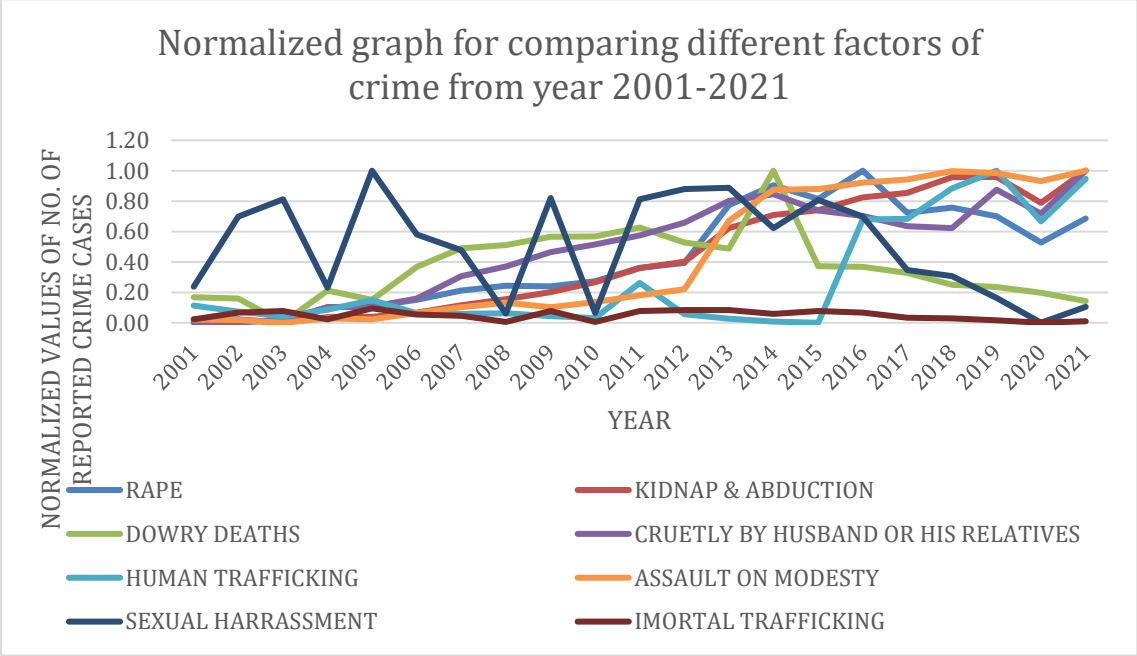

Figure 10: Line graph of different crimes against women in India over the year 2001-2021[ref 10][ref 11]

This line graph shows the comparison between different factors of crime .from graph we can see an increasing trends of crime India.

RESULTS

Time Series analysis

Time series analysis is used to fit a suitable model for Cruelty by husband cases in India.

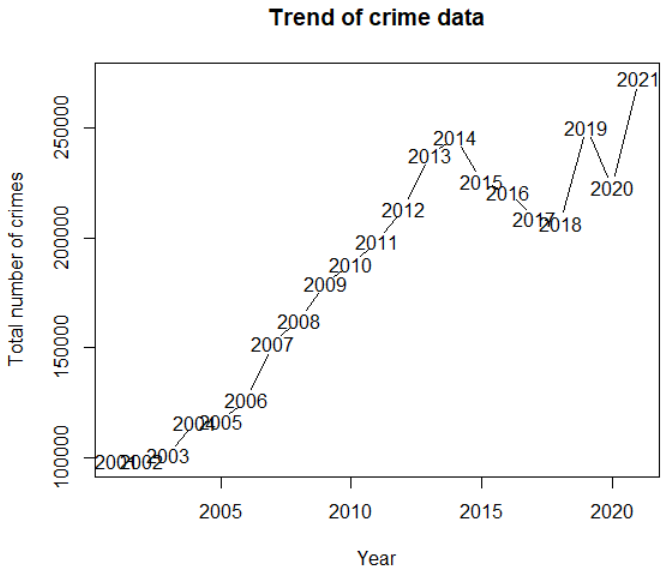

Fig. 11 Time series plot of Cruelty by husband cases[ref 1]

From the figure11 it is clear that there is an irregular trend. So we have to remove the trend by first order differencing.

ACF AND PACF PLOTS

First step in analyzing time series is to examine the **Autocorrelation Function (ACF)** and **Partial Autocorrelation Function (PACF).**

The ACF and PACF plot of the data are

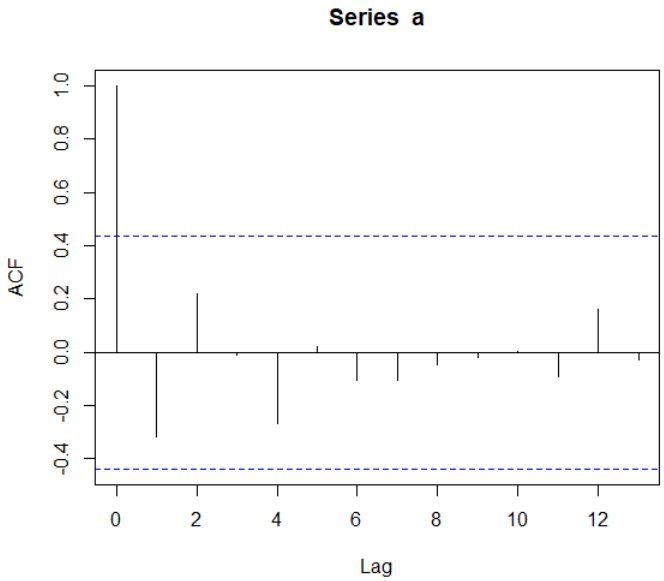

Figure 12: ACF plot[ref 4]

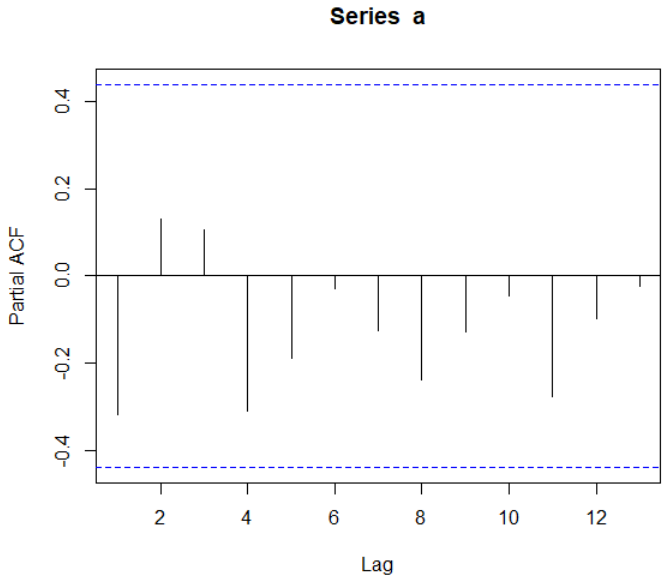

Figure 13: PACF plot[ref 4]

Augmented Dickey Fuller Test

The stationarity of the series can be tested using Augmented Dickey Fuller test. The result of the test is given in Table .

Dickey fuller	Lag order	P_-value	Alternate hypothesis
-1.999	2	0.5728	stationary

Table 9: showing values after implementing Augmented Dickey fuller test

Modelling

The fitted model ARIMA(1,1,0) with drift have the following coefficients,

	ar1	drift
	-0.4054	8230.437
s.e.	0.2321	2735.747

sigma^2 = 317335162: log likelihood = -223.17
AIC=452.34 AICc=453.84 BIC=455.33
Training set error measures:

	ME	RMSE	MAE	MPE	MAPE	MASE	ACF1
Training set	-118.9187	16492.47	13330.54	-0.4598738	6.800322	0.8668524	0.06328237

After having fitted a model to a given count time series, one has to check the adequacy of this model fit ,The standardized residual analysis ,being easy to compute and interpret, are a popular diagnostic approach for this purpose.

Residual analysis

Time series plot for the residuals is given below

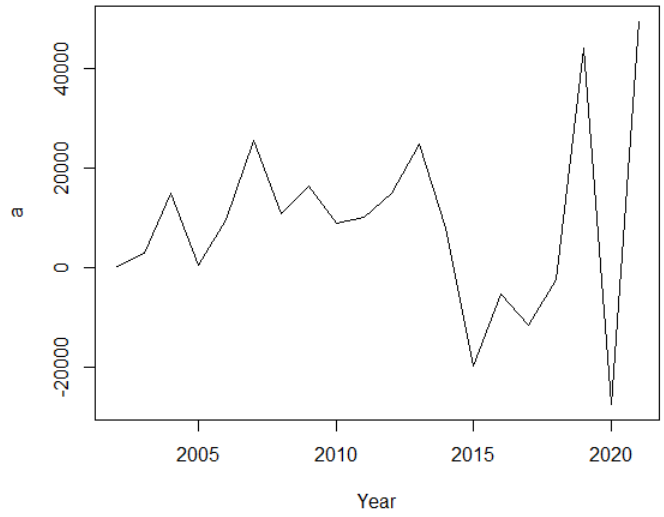

Figure 14: Time series plot of residuals[ref 4]

ACF and PACF plot of residuals

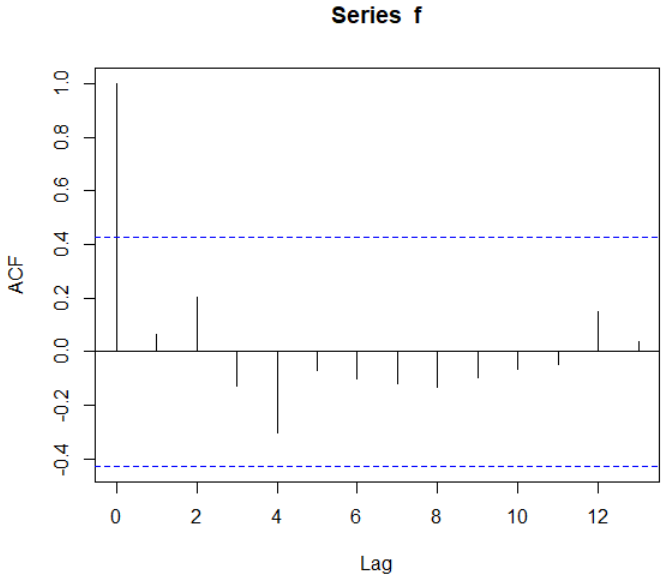

Figure15: ACF plot of residuals[ref 4]

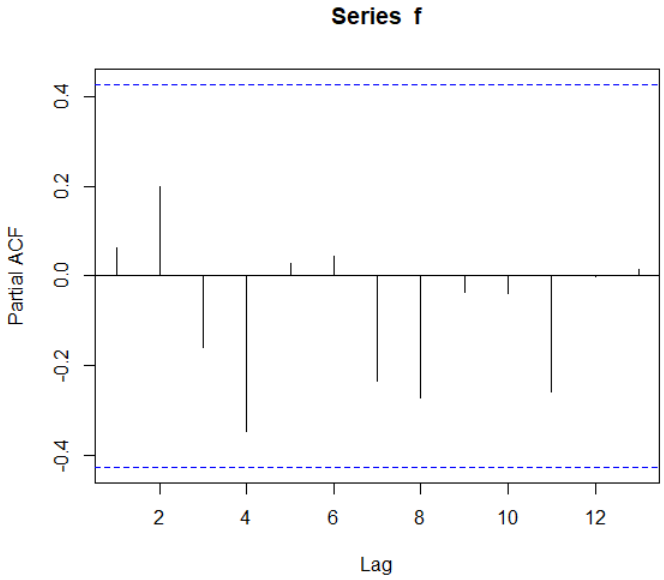

Figure 16: PACF plot of residuals[ref 4]

The actual values and fitted values lies between the upper control limit and lower control limit. From the plot it is clear that the model is adequate.

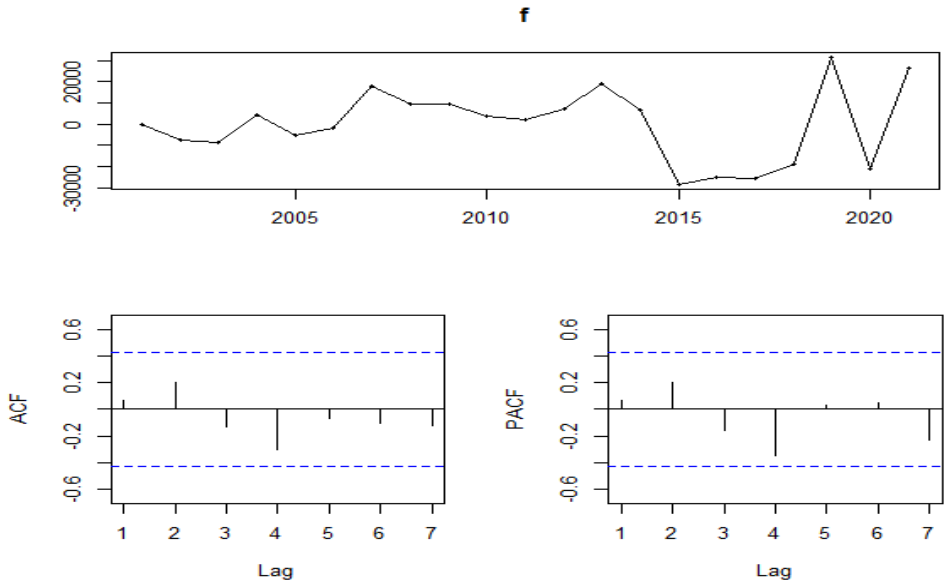

Figure 17: Residual ACF and PACF plots of ARIMA (1,1,0) [ref 4]

From the residual ACF and PACF plots of ARIMA (1,1,0), it was clear that all autocorrelations and partial autocorrelations lie between 95%. This also confirmed the 'good fit' of this selected model

Ljung box Test

We test the hypothesis

H_0: The data are independently distributed.

Against

H_1: The data are not independently distributed; they exhibit serial correlation.

We get,

X-squared = 0.096712,

df = 1,

p-value = 0.7558

So we can conclude that since p-value is greater than **0.05**, we accept the null hypothesis. This shows that the data are independently distributed. Thus our model is valid. Hence we can forecast using this model. [ref 7]

K-S test for Normality

The null hypothesis of K-S test is that the distribution is normal.

We get,

D = 0.10425

p-value = 0.9585

Alternative hypothesis H_1: two-sided

Since p-value is greater than 0.05, we accept the null hypothesis and conclude that the residual distribution is not statistically different from a normal distribution.[ref 7]

Plot of fitted and Actual Values

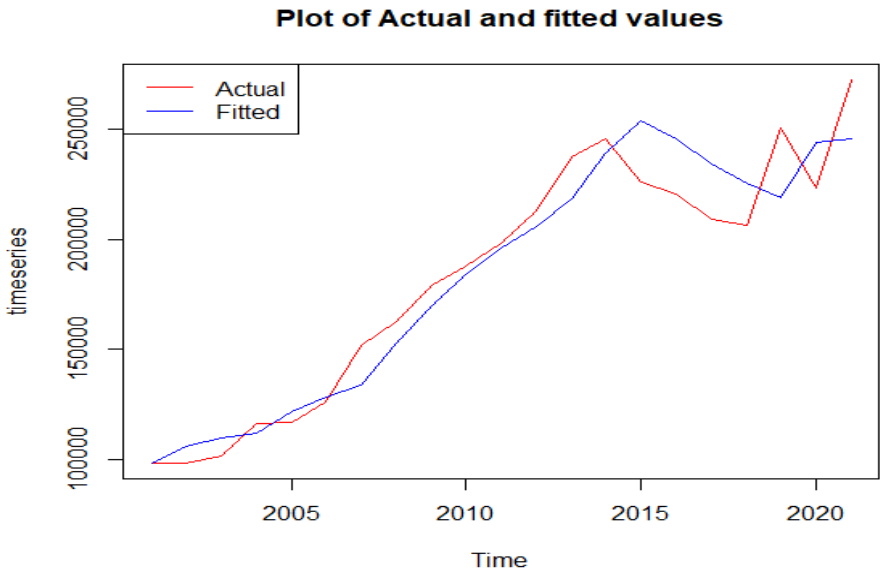

Fig 18: Plot of fitted and actual values

Forecasted values

Time series : start=2001 | end =2021 | frequency=1

Point	Forecast	Lo 80	Hi 80	Lo 95	Hi 95
2022	264029.7	241200.3	286859.1	229115.1	298944.3
2023	279025.5	252465.7	305585.4	238405.8	319645.3
2024	284513.0	252801.5	316224.6	236014.4	333011.7

Graph for the forecasted value

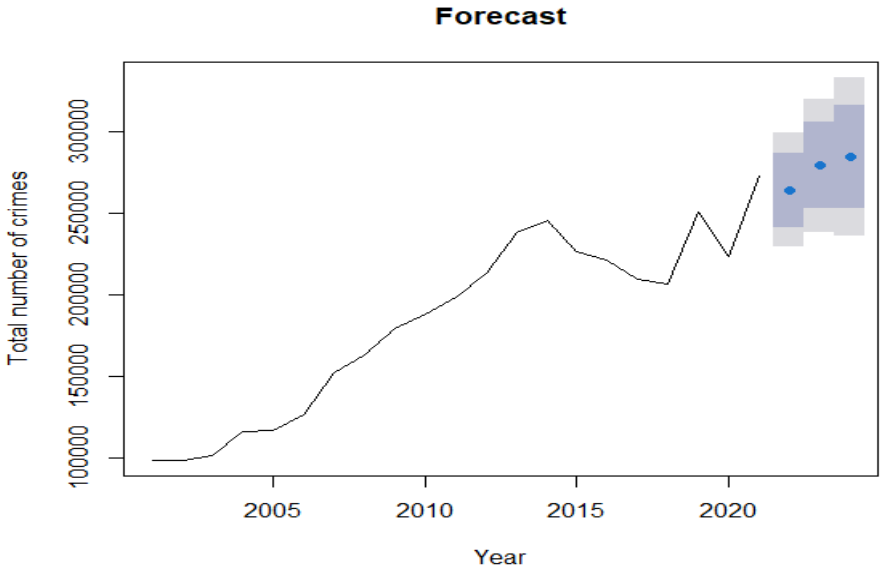

Fig:19 shows forecasted values [ref 4]

CONCLUSION

India stands first among the most dangerous country in the world in terms of crimes against women. From map (fig 1) we came to know about the nature of crimes in different states of India for the years 2001-2021. Uttar Pradesh stands first among other states of India with respect to the percentage of total crimes and Nagaland has the least percentage of crimes. Then we analyze the different categories of crimes against women such as rape, kidnapping and abduction, dowry death, Assault on Woman with Intent to Outrage Her Modesty , Insult to the Modesty of women, cruelty by husband and Importation of Girl from Foreign Country in India and cruelty by husband or his relatives is more reported during these time period.

We used R programming to carry out ARIMA (1,1,0) model fitting, and it was found as most appropriate among other ARIMA models. The reported crime rate for next three years was forecasted with the help of ARIMA model for future data with prediction intervals then we checked whether the fitted models are perfect.

The predicted value for the upcoming years is **264029.7 ,279025.5 ,284513.** Through the forecasting we arrive at the conclusion that the crime 'cruelty by husbands' is increasing .

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