



Trend Analysis of Crime Against Women and Violent Crimes in Kerala and Uttar Pradesh

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ABSTRACT

Crime data in India shows clear differences across states and across time. This study examines long-term trends in crime against women and selected violent crimes in Kerala and Uttar Pradesh from 2001 to 2022. Tracing two decades of crime patterns are evidenced from official crime data and literacy data. The scatter plots show a positive association between female literacy rate and reported crime against women rate in both states. This relationship appears stronger and more consistent in Kerala than in Uttar Pradesh. Category-wise trend graphs show that Kerala reports higher rates in crimes such as rape, assault on women with intent to outrage her modesty, and cruelty by husband or his relatives. Uttar Pradesh shows higher levels in kidnapping and abduction of women and dowry-related offences.

Category-wise trend graphs of crime against women reveal distinct regional patterns. Kerala consistently records higher reported rates for crimes such as rape, assault on women with intent to outrage her modesty, and cruelty by husband or his relatives. In contrast, Uttar Pradesh shows higher and rising trends in kidnapping and abduction of women, dowry deaths, and offences under the Dowry Prohibition Act, 1961.

Trends in violent crimes indicate a decline in serious crimes such as murder and dacoity in both states, while offences such as cheating and causing death by negligence show rising trends, especially in Uttar Pradesh. The study highlights that graphical analysis is useful for understanding long-term crime patterns and regional differences using official crime data.

Overall, the graphical evidence highlights contrasting crime structures and reporting patterns between the two states, which can enhance the systematic study, mapping and tracing the criminal activity over time.

Keyword: Crime against women, violent crime, Scatter plots, trend analysis.

1. INTRODUCTION

Crime is not only a legal issue but also a critical social and developmental issue. Crime patterns change over time due to factors such as social awareness, education, economic conditions, and administrative systems. In the context of India's long-term development vision VIKSIT BHARAT @2047, understanding changes in crime patterns is essential for assessing progress towards social justice, gender equity, and effective governance.

In India, official crime statistics are published annually by the National Crime Records Bureau (NCRB). These reports provide state-level information on different types of crimes, including crime against women and violent crimes. Such long-term official data serve as an important evidence base for evaluating institutional performance and social transformation across regions.

The literacy and population benchmarks used for interpretation in this study are supported by official publications of the Census of India, including Census of India (2001): Primary Census Abstract – Literacy and Population Tables, and Census of India (2011): Literacy and Population Data, published by the Office of the Registrar General and Census Commissioner, India. These sources provide the official demographic and literacy foundation for long-term social and crime trend analysis.

Crime against women includes offences such as rape, assault on women, cruelty by husband or his relatives, dowry deaths, and kidnapping and abduction of women. Violent crimes include offences such as murder, attempt to murder, kidnapping, robbery, dacoity, cheating, and causing death by negligence. Studying long-term trends in these crimes helps in understanding how crime structures evolve in response to social change and development processes.

Female literacy is widely recognised as a key indicator of women's awareness, empowerment, and participation in society. Higher literacy levels may improve knowledge of legal rights and increase confidence in approaching police and legal institutions. Therefore, examining the association between female literacy rate and crime against women rate

is important for correctly interpreting crime statistics within a development-oriented framework such as Viksit Bharat @2047.

Previous studies using NCRB data have highlighted that crime patterns differ widely across Indian states. Chakraborty, Afreen, and Pal (2021) observed strong regional variation in crime against women and pointed out that better reporting mechanisms can result in higher recorded crime rates. Košir and Lakshminarayanan (2025) examined the relationship between female literacy and crime against women in India and found that the relationship is complex. The reviewed studies employ a range of methodologies, including descriptive statistics, rate-based comparisons, district-level estimation, and institutional analysis. Pooja et al. (2024) emphasise the importance of statistical rigor and population normalisation for meaningful comparisons across regions. Joseph et al. (2017) demonstrate the usefulness of alternative survey-based techniques to address underreporting in official crime data.

While these studies provide valuable insights, many focus either on national-level patterns or rely heavily on statistical models. Fewer studies present a clear and accessible graphical comparison of multiple crime categories across states over a long-time horizon, which is essential for policy interpretation and public understanding.

Research Gap: Although long-term NCRB data is publicly available, limited studies have presented a direct graphical comparison of crime against women and violent crimes between Kerala and Uttar Pradesh over two decades. The relationship between female literacy and crime against women is often discussed, but visual examination using multi-year scatter plots remains limited. There is also a lack of studies that integrate literacy–crime association with category-wise crime trends within a single graphical framework. Addressing this gap is important for strengthening evidence-based policy discussions aligned with India’s goal of inclusive and equitable development under Viksit Bharat @2047. The main objectives of this study are to examine long-term trends in crime against women in Kerala and Uttar Pradesh from 2001 to 2022 using graphical analysis and to study the trends in selected violent crimes in both states over the same period. The picture of association between female literacy rate and crime against women rate using scatter plots is clearly explained and differences in reported crime patterns between Kerala and Uttar Pradesh is also compared.

2. LITERATURE METHODOLOGY

The study is based entirely on secondary data obtained from official and publicly available sources. Crime-related data for crime against women and selected violent crimes were sourced from the annual Crime in India reports published by the National Crime Records Bureau under the Ministry of Home Affairs, Government of India. Female literacy data were taken from publications of the Census of India, while population data were obtained from official population projection reports of the Government of India. The materials used in the study include NCRB Crime in India reports (2001–2022), Census of India female literacy data (2001 and 2011), and official Population Projections for India and States, 2011–2036 (used for 2001–2022 estimates). The study follows a graphical and descriptive statistical analysis. The methodology consists of the following steps:

Descriptive Analysis: Descriptive statistical measures such as mean, standard deviation, minimum, maximum, and coefficient of variation were computed for crime rates across categories and states. This helped in understanding central tendency, variability, and long-term stability of crime patterns before graphical and comparative interpretation.

Data Compilation and Standardisation: Year-wise crime data for Kerala and Uttar Pradesh were compiled for major categories of crime against women and selected violent crimes. Female literacy and population data were compiled from official government sources. Crime figures were converted into crime rates per 1,00,000 population and per 1,00,000 female population to enable meaningful comparison across states and years.

Graphical Representation: Line graphs were used to analyse long-term trends in different crime categories. Scatter plots were used to examine the association between female literacy rate and crime against women.

Comparative Analysis: Visual comparison was carried out to identify similarities and differences in crime patterns between Kerala and Uttar Pradesh.

The population figures were used directly to calculate crime rates per 1,00,000 population and per 1,00,000 female population as presented in the graphs. Since the population values were explicitly available in the projection report, no interpolation or estimation was applied to

population data, ensuring accuracy and consistency in rate calculations across the study period.

Tools and Techniques: Data organisation and graphical analysis were carried out using spreadsheet-based tools. Line graphs and scatter plots served as the primary analytical instruments to identify trends, associations, and variations over time.

Reliability and Limitations: Reliability of the study is ensured using official government publications that follow standardised data collection and reporting procedures. However, the study is subject to limitations such as underreporting of crimes, changes in legal definitions over time, and reliance on reported crime data. The analysis does not account for socio-economic or institutional variables not represented in the graphs.

3. RESULTS AND DISCUSSION

3.1 Female Literacy and Crime Against Women

The scatter plot for Kerala shows a clear upward pattern. As female literacy increases over time, the crime against women rate also increases. The points are closely aligned with the fitted trend line, indicating a strong positive association. In Uttar Pradesh, the scatter plot also shows a positive association, but the pattern is more scattered. The increase in crime against women appears slower in the early years and sharper in later years as literacy improves.

These patterns suggest that higher literacy is associated with higher reported crime against women, which may reflect increased awareness and reporting, as also discussed by Chakraborty et al. (2021) and Košir and Lakshminarayanan (2025).

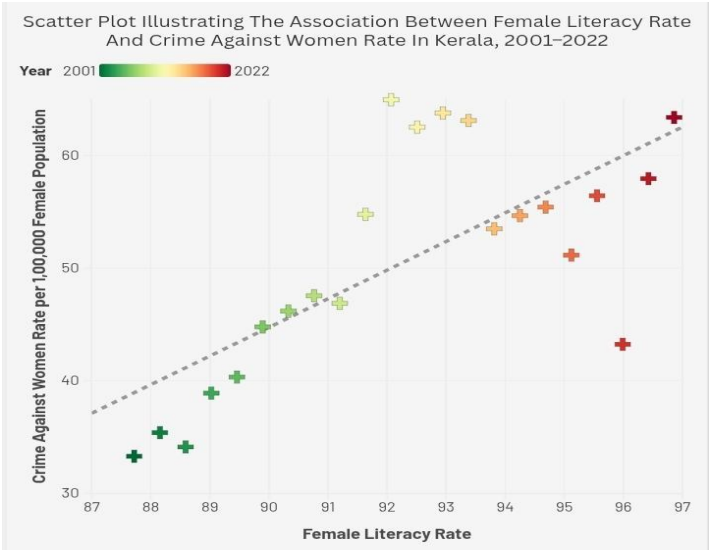


Figure 3.1: Scatter plot showing the association between female literacy rate and crime against women rate in Kerala, 2001–2022. Source: Kerala, 2001–2022.

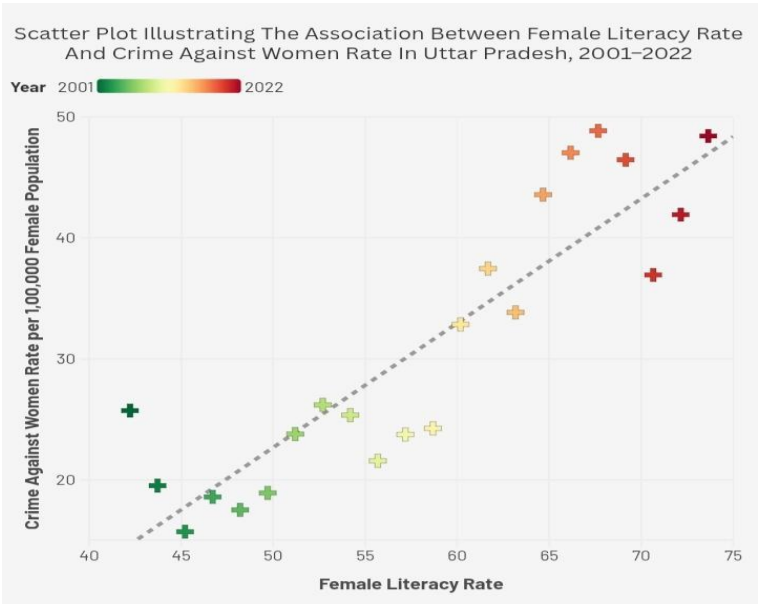


Figure 3.2: Scatter plot showing the association between female literacy rate and crime against women rate in Uttar Pradesh, 2001–2022. Source: Uttar Pradesh, 2001–2022

3.2 Descriptive Analysis

Before examining long-term trends, descriptive statistics are presented to understand the distributional characteristics, central tendency, and variability of crime against women rates and violent crimes rates in Kerala and Uttar Pradesh over the period 2001–2022. This preliminary analysis provides a structural overview of the magnitude and fluctuation patterns across major crime categories.

Crime Category	Mean S.D.	±	Min	Max	C.V. (%)
Rape	5.46 2.93	±	2.38	11.20	53.88
Kidnapping and Abduction of Women	0.97 0.22	±	0.55	1.32	22.32
Dowry Deaths	0.12 0.05	±	0.03	0.20	44.21
Assault on Women with intent to outrage her Modesty	19.33 5.08	±	11.75	26.97	26.25
Insult to the Modesty of Women	1.91 0.90	±	0.41	3.30	46.86
Cruelty by Husband or his relatives	21.80 5.51	±	11.38	30.94	25.27

Dowry Prohibition Act, 1961	0.04 0.05	±	0.01	0.21	118.65
Indecent Representation of Women (Prohibition) Act, 1986	0.13 0.15	±	0.01	0.64	120.03
Immoral Traffic (Prevention) Act, 1956	0.79 0.56	±	0.02	1.83	70.30

Table 3.2.1: Descriptive Statistics of Crime Against Women Rates in Kerala (Per 1,00,000 Female Population), 2001–2022
Source: Author Compiled

In Kerala, the mean rape rate was 5.46 (SD = 2.93), ranging from 2.38 to 11.20, showing substantial variability, particularly after 2012. Assault on women with intent to outrage her modesty recorded a high mean of 19.33 (SD = 5.08), while cruelty by husband or his relatives had the highest average rate at 21.80 (SD = 5.51). Very high coefficients of variation were observed in special legislation categories such as the Indecent Representation of Women (Prohibition) Act, 1986 (CV = 120.03%) and Dowry Prohibition Act, 1961 (CV = 118.65%), suggesting irregular reporting rather than stable crime patterns.

Crime Category	Mean S.D.	±	Min	Max	C.V. (%)
Rape	2.47 ± 0.90		1.11	4.59	36.45
Kidnapping and Abduction of Women	7.47 ± 3.99		1.83	14.19	53.39

Dowry Deaths	2.24 ± 0.27	1.62	2.81	12.02
Assault on Women with intent to outrage her Modesty	5.83 ± 3.60	1.34	11.84	61.65
Insult to the Modesty of Women	1.44 ± 1.85	0.00	6.08	128.93
Cruelty by Husband or his relatives	9.74 ± 3.68	3.21	17.45	31.81
Dowry Prohibition Act, 1961	1.61 ± 1.43	0.12	4.12	88.75
Indecent Representation of Women (Prohibition) Act, 1986	0.001 ± 0.003	0.00	0.02	225.76
Immoral Traffic (Prevention) Act, 1956	0.04 ± 0.02	0.01	0.08	44.00

Table 3.2.2: Descriptive Statistics of Crime against Women Rates in Uttar Pradesh (Per 1, 00,000 Female Population), 2001–2022

Source: Author Compiled

In Uttar Pradesh, kidnapping and abduction of women showed a relatively high mean of 7.47 (SD = 3.99) with wide fluctuation. Cruelty by husband or his relatives averaged 9.74 (SD = 3.68). In contrast, dowry deaths exhibited lower variability (CV = 12.02%), indicating structural persistence over time.

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Crime Category	Mean S.D.	±	Min	Max	C.V. (%)
Murder	1.10 0.18	±	0.85	1.48	16.25
Attempt to commit Murder	0.95 0.60	±	0.22	1.93	64.69
Culpable Homicide not Amounting to Murder	2.64 2.72	±	0.26	6.65	103.27
Kidnapping and Abduction	0.80 0.16	±	0.51	1.14	20.14
Dacoity	0.28 0.11	±	0.17	0.55	37.34
Making Preparation and Assembly for committing Dacoity	0.33 0.31	±	0.01	0.86	96.25
Robbery	2.21 0.29	±	1.62	2.65	13.15

Burglary	9.73 3.11	±	4.64	14.45	31.92
Theft	13.63 3.17	±	6.93	17.95	23.24
Riots	19.47 8.01	±	4.43	32.59	41.16
Criminal Breach of Trust	0.92 0.27	±	0.34	1.34	29.26
Cheating	13.36 3.98	±	8.66	24.09	29.77
Counterfeiting	0.21 0.15	±	0.07	0.75	73.58
Arson	1.31 0.36	±	0.73	2.41	27.57
Causing Death by Negligence	3.96 + 4.73		0.00	10.22	119.50

Table 3.2.3: Descriptive Statistics of Violent Crimes Rates in Kerala (Per 1, 00,000 Population), 2001–2022

Source: Author Compiled

In Kerala, the murder rate remained relatively stable with a mean of 1.10 (SD = 0.18). However, riots displayed high dispersion (Mean = 19.47, SD = 8.01), indicating episodic spikes. Culpable homicide not amounting to Murder showed extreme variability (CV = 103.27%), reflecting structural breaks in later years.

Crime Category	Mean S.D.	±	Min	Max	C.V. (%)
Murder	2.51 0.80	±	1.43	4.57	31.87
Attempt to commit Murder	2.10 1.14	±	0.50	4.79	54.17
Culpable Homicide not Amounting to Murder	0.74 0.11	±	0.52	0.96	14.95
Kidnapping and Abduction	4.52 2.43	±	1.28	9.55	53.79
Dacoity	0.17 0.11	±	0.03	0.54	66.73
Making Preparation and Assembly for committing Dacoity	0.05 0.03	±	0.02	0.11	53.48

Robbery	1.39 0.42	±	0.69	2.30	30.46
Burglary	3.11 0.63	±	2.33	5.06	20.28
Theft	17.41 5.09	±	9.13	27.08	29.23
Riots	2.69 0.76	±	1.31	4.42	28.32
Criminal Breach of Trust	1.96 0.47	±	1.01	3.05	24.15
Cheating	3.89 1.08	±	1.69	5.63	27.80
Counterfeiting	0.10 0.06	±	0.02	0.22	58.01
Arson	0.22 0.13	±	0.09	0.60	58.35
Causing Death by Negligence	6.53 ± 2.09		2.57	9.50	32.08

Table 3.2.4: Descriptive Statistics of Violent Crimes Rates in Uttar Pradesh (Per 1,00,000 Population), 2001–2022

Source: Author Compiled

In Uttar Pradesh, murder averaged 2.51 (SD = 0.80), while kidnapping and abduction showed considerable fluctuation (Mean = 4.52, SD = 2.43). Theft recorded a comparatively high mean of 17.41 (SD = 5.09).

Overall, crime against women categories demonstrate higher variability compared to core violent crimes. The increased dispersion observed after 2012 in several categories may reflect improved reporting practices and institutional responsiveness rather than a uniform rise in criminal behaviour.

3.3 Trends in Crime against Women

The following figures show how different categories of crime against women have changed over time in both states.

Rape: Kerala shows a clear long-term increase in rape rates, especially after 2010. A strong rise is visible during the mid-2010s, followed by a temporary decline around 2020, and then a partial recovery in the later years. This pattern suggests better reporting, higher legal awareness, and improved access to institutions, along with the presence of some structural vulnerabilities. Uttar Pradesh records lower overall rape rates, but shows a slow and steady increase over time. This trend suggests that rape was underreported in earlier years and that the increase mainly reflects gradual improvement in reporting, rather than a sudden rise in actual crime.

Kidnapping and Abduction of Women: A strong contrast is observed between the two states in this category. Uttar Pradesh shows a sharp and continuous increase, reaching a peak in the late 2010s. Kidnapping and abduction of women is one of the major contributors to crime against women in the state. Kerala, on the other hand, records very low and stable rates throughout the period. This difference reflects deep structural, demographic, and governance-related factors, rather than short-term policy changes.

Dowry Deaths: Dowry deaths remain consistently higher in Uttar Pradesh, although a slow decline is visible in the later years. In contrast, Kerala records very low and declining rates throughout the period. This difference highlights strong social resistance, better enforcement, and

institutional control over dowry-related violence in Kerala, while also reflecting deep-rooted socio-cultural differences between the two states.

Assault on Women with Intent to Outrage her Modesty: Kerala shows a strong and continuous increase in this category, especially after 2008, making it one of the most significant crimes against women in the state. Uttar Pradesh also shows an upward trend, but at a much lower level. This gap reflects differences in reporting behaviour, legal interpretation, and social willingness to recognise and report such offences.

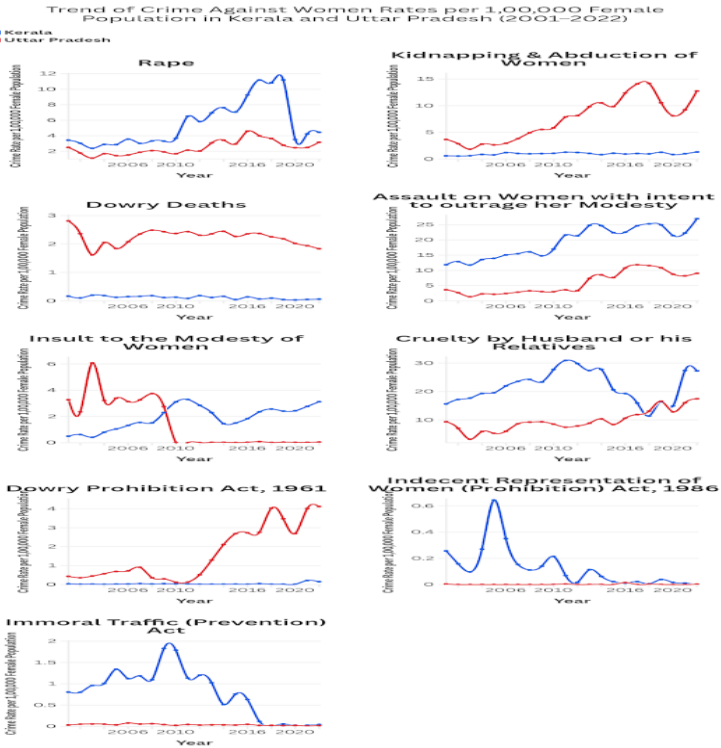


Figure 3.3: Category-wise trends of crime against women per 1, 00,000 female population in Kerala and Uttar Pradesh, 2001–2022.
Source: Uttar Pradesh, 2001–2022

Cruelty by Husband or His Relatives: This is the dominant category of crime against women in Kerala. The rates peak around 2010–2012, decline afterward, and then rise again after 2019. This pattern suggests strong reporting mechanisms combined with changing social and economic pressures. Uttar Pradesh records lower but steadily increasing

rates, which points to gradual institutional visibility rather than sudden changes in behaviour.

Dowry Prohibition Act, 1961: Kerala records near-zero rates under this Act throughout the period. Uttar Pradesh shows a sharp rise after 2013, which coincides with stricter enforcement and increased use of legal provisions. This rise reflects greater legal action and reporting, not necessarily worsening conditions.

Indecent Representation of Women (Prohibition) Act, 1986: Kerala shows occasional spikes in the early years, followed by near-zero values in later years, suggesting declining relevance or legal reclassification. Uttar Pradesh records almost no cases under this Act, indicating that this category is highly dependent on enforcement priorities rather than actual prevalence.

Immoral Traffic (Prevention) Act: Kerala shows moderate activity until the mid-2010s, after which the rates decline sharply, possibly due to focused policing or definitional changes. Uttar Pradesh remains near zero throughout, suggesting limited detection or reporting under this category.

3.4 Trends in Violent Crimes

This section examines the trends of different violent crime categories in Kerala and Uttar Pradesh from 2001 to 2022. Instead of looking at violent crime as a single group, each major category is analysed separately. This helps in understanding which crimes are declining, which are rising, and how patterns differ between the two states. The analysis is based on violent crime rates per 1,00,000 population, which allows meaningful comparison despite population differences.

Murder: Uttar Pradesh starts the period with much higher murder rates compared to Kerala. However, over time, these rates show a steady decline, which indicates gradual improvement in law-and-order conditions. This long-term fall suggests better policing and crime control efforts. On the other hand, Kerala records low and stable murder rates throughout the entire period. There are no sharp increases, showing that lethal violence has remained relatively limited.

Attempt to Commit Murder: In Kerala, the rate of attempt to commit murder shows sharp spikes during the mid-2010s. These spikes appear to be short-term and episodic, rather than part of a continuous rising

trend. This suggests isolated incidents or temporary tensions rather than long-term escalation. Uttar Pradesh shows a more stable and generally declining pattern in this category, indicating gradual control over serious violent confrontations.

Culpable Homicide Not Amounting to Murder: This category shows high fluctuation, especially in Uttar Pradesh. The sharp ups and downs suggest that this crime type is highly sensitive to legal classification and reporting practices, rather than reflecting actual behavioural changes. Kerala's rates in this category remain consistently low, indicating fewer such cases or more stable classification practices.

Kidnapping and Abduction: Kidnapping and abduction show a strong upward trend in Uttar Pradesh, making it one of the fastest-growing violent crimes in the state. This increase points to structural challenges such as population pressure, migration, economic vulnerability, and organised crime activity. Kerala records consistently low rates for kidnapping and abduction throughout the period, indicating better control over this crime category.

Dacoity and Preparation for Dacoity: Both Kerala and Uttar Pradesh show a clear long-term decline in dacoity and preparation for dacoity. This trend reflects the decline of traditional organised violent crimes, possibly due to improved surveillance, policing, and technological intervention. The decline is steady and visible across the study period in both states.

Robbery and Burglary: Kerala reports higher rates of robbery and burglary, especially burglary, when compared to Uttar Pradesh. However, these rates show a gradual declining trend, indicating improving prevention and enforcement. Uttar Pradesh records lower overall rates, but with occasional sharp spikes, suggesting irregular enforcement or temporary crime surges.

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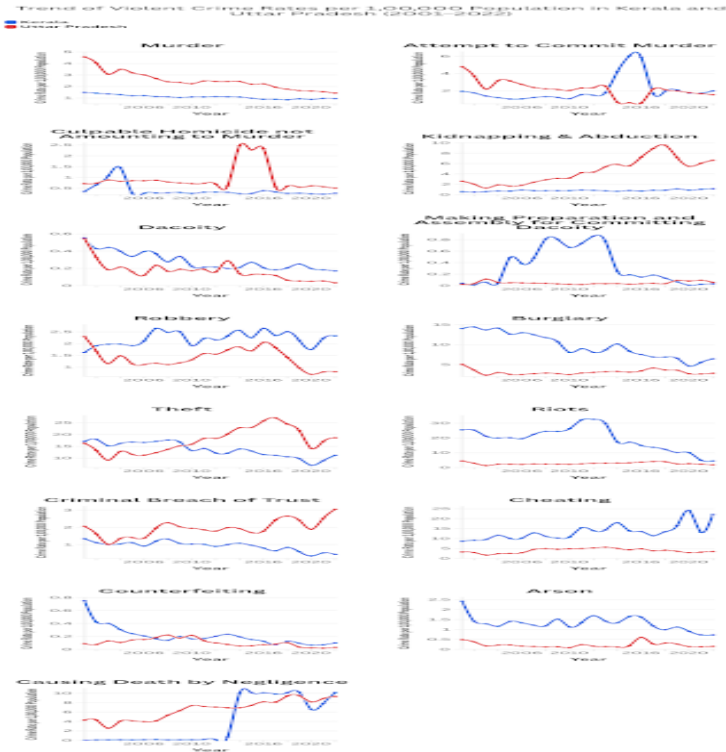


Figure 3.4: Trends of selected violent crime rates per 1,00,000 population in Kerala and Uttar Pradesh, 2001–2022.

Source: Uttar Pradesh, 2001–2022

Theft: Theft trends in Uttar Pradesh show large cyclical fluctuations. Rates peak during the mid-2010s, followed by a sharp decline in 2020, which coincides with COVID-19 lockdowns. Kerala shows a gradual long-term decline in theft, with a temporary drop during the pandemic period due to restricted mobility and reporting disruptions.

Riots: Kerala records high riot rates in the early 2000s, reflecting political mobilisation and mass protests during that period. After 2012, there is a sharp decline, indicating better crowd control and conflict management. Uttar Pradesh shows lower riot rates, but these appear to be more persistent over time, suggesting recurring public-order challenges.

Criminal Breach of Trust and Cheating: In Kerala, criminal breach of trust shows a declining trend, while cheating cases increase over time. This pattern reflects changes in economic behaviour, financial

transactions, and reporting practices. Uttar Pradesh shows steady increases in both breach of trust and cheating, indicating expanding economic activity, financial disputes, and improved reporting of such crimes.

Counterfeiting, Arson, and Causing Death by Negligence: Counterfeiting and arson show a steady decline in both states, suggesting improved surveillance and crime control. In contrast, causing death by negligence increases sharply, especially in Kerala after 2015. This rise reflects greater motorisation, industrial growth, urban expansion, and better legal recognition and reporting of such incidents rather than sudden behavioural change.

4. CONCLUSION

The descriptive statistical analysis conducted in this study further supported the graphical findings by quantifying central tendency and variability in crime rates. Measures such as mean, standard deviation, minimum, maximum, and coefficient of variation helped identify stable crime categories (such as murder) and highly fluctuating categories (such as special law offences and riots). The increase in dispersion among various crime against women categories, especially after 2012, is an indicator of the changes in the reporting of crime, level of awareness, and institutional response among the states.

The graphical analysis shows a positive association between female literacy and reported crime against women in both states, with the relationship appearing stronger in Kerala. This suggests that higher literacy and awareness may contribute to improved reporting rather than an actual increase in crime incidence.

Category-wise trends reveal clear regional differences. Kerala consistently records higher reported rates of crimes such as rape, assault, and cruelty by husband or his relatives, while Uttar Pradesh shows higher and rising trends in kidnapping and dowry-related offences. In the case of violent crimes, both states exhibit a long-term decline in murder and dacoity, while crimes such as cheating and causing death by negligence increase over time.

These findings indicate that reported crime statistics reflect not only criminal activity but also differences in awareness, reporting behaviour, and institutional context. The graphical approach used in this study

provides a clear and accessible method for understanding long-term crime patterns and regional variation.

In the broader context of VIKSIT BHARAT @2047, the study highlights the importance of education, awareness, and institutional capacity in shaping crime statistics and social outcomes. The results can assist researchers, policymakers, and students in interpreting crime data more accurately and in designing development-oriented interventions. Future studies may extend this work by incorporating district-level analysis and additional socio-economic indicators to gain deeper insights into crime dynamics in a transforming India.

Based on the findings, it is suggested that strengthening reporting mechanisms, improving victim support systems, and enhancing awareness programmes, particularly in low-reporting regions. Expansion of women-centric policing units, faster judicial processing of crime against women cases, and integration of literacy and legal awareness programmes may help in improving both reporting accuracy and crime prevention. Future research should prioritise district-level modelling, inclusion of socio-economic variables such as employment and urbanisation, and evaluation of policy interventions over time to support evidence-based governance and long-term social development planning.

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