

Crime Against Women in India (2001–2010): A Decadal Statistical Analysis

INTRODUCTION:

Crime is cited as actions that cause harm and violate social norms. It is a type of social construct which is considered criminal because of societal attitudes.

A woman is killed every 10 minutes by an intimate partner or a family member. In 2023 alone, nearly 51,100 women and girls got killed by a relative or intimate partner all over the world. Globally, 60% of all female homicides are committed by intimate partners or family members.

Crime against women - particularly intimate partner crime and sexual crime - is a major violation of women's human rights. Estimates published by WHO show that about 1 in 3 (30%) of women all around the world have been subjected to either physical and/or sexual violence by intimate partner or non-partner sexual violence in their lifetime.

According to the report by the United Nations: Violence against women is defined/considered as "any act of gender-based violence that results in, or is likely to result in physical, sexual, mental harm or suffering caused to women, including any threats of such acts, forceful or arbitrary deprivation from liberty, whether in public or in private life".

Thus, what we conclude by the United Nations finding is that: any act of gender-based violence that results in, or is likely to result in, physical, sexual, mental harm or suffering to women... is considered a crime against a woman.

These acts rob women of safety, dignity and equality, and their impact extends way beyond direct victims; it goes on to haunt families, communities and society at large. The underlying persistent fear, social stigma and limited access to justice are recurring challenges that worsen the consequences, making safety and empowerment for women a distant goal in many regions.

For going against all this there is a necessity of objective-based analysis that will move beyond anecdotal and descriptive accounts. Systematic study could help to uncover the hidden/underlying patterns, regional trends and contributing social factors, thereby helping in gathering more precise and effective interventions. The goal of this research is firstly to leverage all the robust datasets—particularly those which are compiled by the National Crime Records Bureau (NCRB) to dive deeper in it for the understanding of crime dynamics which will intend to highlight gaps in existing policies thus laying down the groundwork for impactful and actionable solutions.

The following literature review draws on from a diverse range of empirical and analytical studies carefully put together without any biases helping connect the dots about social, geographic, and statistical dimensions of the crimes against women using the help of the NCRB dataset, which has a major role in framing the scope and direction of this research.

LITERATURE REVIEW:

The modern literature is based specifically on the crimes against women in India and reveals an ever-evolving narrative that progresses from traditional statistical mapping to the adoption of advanced analytical and machine learning frameworks for actionable policy and policing.

Early work by Pooja, Guddattu, and Rao (2024) set the stage with district-level risk estimation of crimes against women, using robust statistical models to identify persistent geographic hotspots. This micro-level focus allowed policymakers to visualize not just national or state patterns but underlying local risks that may otherwise remain concealed in aggregate analyses.

Building on this foundation, Singh (2024) brought a panoramic lens using NCRB 2023 data to highlight both the diversity and complexity of crime trends—including domestic violence and emerging cybercrimes—thereby connecting quantitative modelling with lived, evolving realities.

However, geographic and temporal fluctuations in crime rates raised further questions about why certain regions see rising incidents at specific times. Akhtar (2025) responded by blending spatial and trend analysis, uncovering surges in crimes against women through rigorous mapping and longitudinal examination of NCRB data. This progression from static data snapshots to dynamic, time-sensitive maps enabled researchers and decision-makers to not only see where, but also when and potentially why, risk escalates.

Social science perspectives add critical nuance: Ghusingha (2023) combined statistical empowerment indices with crime data, uncovering that regions with stronger social and economic standing for women consistently demonstrate lower crime rates. Here, the challenge of underreporting emerges, complicated further by findings from Chakraborty, Afreen, and Pal (2021), who emphasized gaps in not just prevalence, but also the documentation and reporting of violent acts—reminding us that the true scale is likely underrepresented in available data.

Region-specific insights, like those offered by Saheb (2021) and the Science and Information SAI Organization, reinforce the heterogeneity of risk factors and reporting dynamics, guiding more targeted regional approaches to prevention and redressal.

Amid these quantitative, spatial, and social approaches, a palpable shift is observed as the field increasingly embraces machine learning (ML) and artificial intelligence (AI) to better understand and predict crime trends. Studies such as "Analytics of Crime Against Women Using ML Algorithms" (IJREAM) and "Leveraging ML to Predict Crime Against Women" (IJERT) illustrate how supervised models—such as classification algorithms and clustering—can identify nuanced patterns from crime datasets, forecast high-risk zones, and provide predictive support to law enforcement. These methods move the field from retrospective reporting to proactive identification of emerging threats, allowing agencies to allocate resources and design preventive strategies with unprecedented precision.

This technological momentum is echoed in the systematic review by Dakalbab (2022), which synthesizes international advancements in AI-driven crime prediction, validating the place of machine learning as not just an academic exercise but an essential component of effective safety policy.

Contextual statistics and reports (World Population Review 2020; Sarda 2020) help corroborate these findings, situating India's challenges in the global landscape and underlining the urgent need for both improved conviction rates and innovative prevention strategies.

UN Women (2021): The United Nations agency has reported that one in three women on a global basis have experienced physical and/or sexual violence in their lifetime.

Campbell, J. (2002): Studies cited in a 2013 paper in Life Science Journal, Campbell found that Violence Against Women can lead to serious mental and physical health consequences, such as post-traumatic stress disorder (PTSD), depression, chronic pain and reproductive health issues.

Mishra et al. (2014) - Analysis of domestic violence predictors using NFHS data.

Yee, A. (2013, April 27). Reforms urged to tackle violence against women in India. *The Lancet*, 381(9876), 1445–1446.

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Smile Foundation. (2025, July 27). Crimes against women in India: Types, trends, and empowerment.

Saxena, T. (2025, October 13). Crimes against women in India: Trends, challenges, and policy responses. SPRF India.

Ministry of Home Affairs, Government of India. (n.d.). Crime against women. Retrieved October 2025.

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PARI Library. (2024, October 15). Violence against women in India: A PARI Library bulletin on how abuse and harassment of women, often with brutal force, limits their mobility and compromises their safety.

Shah, M. (n.d.). An overview of crimes against women in India. LawX.

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Preethi, P., & Dharshini, M. (2021). Highlight crimes committed against women in India. *International Journal of Engineering Applied Sciences and Technology*, 6(1).

Bushra Sabri , Abha Rai , Arthi Rameshkumar (2022): Violence Against Women in India: An Analysis of Correlation between Domestic Violence, Barriers and Facilitators of Access to Resources for Support.

Ameeta Kalokhe, Carlos del Rio, Kristin Dunkle, Rob Stephenson, Nicholas Metheny, Anuradha Paranjape, Seema Sahay (2016): Domestic violence against women in India: A systematic review of a decade of quantitative studies.

Sanjeeb K Mishra, Gourahari Pradhan, Subrat K Pradhan, Gitarani Choubey (2024): Prevalence and Predictors of Domestic Violence in India: Complex Sample Analysis of a Nationally Representative Study Conducted Between 2019 and 2021.

B S Pooja, Vasudeva Guddattu, K Aruna Rao (2024): Crime against women in India: district-level risk estimation using the small area estimation approach

Bushra Sabri , Anna Marie Young (2021): Contextual factors associated with gender-based violence and related homicides perpetrated by partners and in-laws: A study of women survivors in India.

W.H.O. (2013), Global and Regional Estimates of Violence Against Women.

The study reveals that about 35% of women all over the world face physical or sexual violence, framing it as a global public health emergency.

RESEARCH METHODOLOGY:

We gathered information on crimes against women from the National Crime Records Bureau (NCRB). This data spanned across all states and union territories of India over the period from 2001 to 2010. Since the data came from official government sources, it proved quite reliable for year-to-year comparisons.

We relied on Python for processing, especially the Pandas library to manage everything. Cleaning the data involved dropping duplicates and fixing all missing or partial entries. We filled in a handful of those gaps with straightforward techniques, so the absences won't skew the overall analysis.

For better understanding, reported crimes are sorted into three main groups. Domestic ones covered dowry deaths, cruelty from husbands or relatives, and general domestic violence. Sexual categories included rape, harassment, and molestation cases. Then societal types took in kidnapping, trafficking, indecent representation, and related offenses. Such organization made it easier to spot patterns and compare them.

We also placed each state into a standard region, like Central, East, Island, North, West, South, or North-East. A short code handled the mapping automatically for accuracy. This setup allowed for solid regional breakdowns down the line.

Certain smaller states showed only a few incidents in some years. To handle zero counts in rate calculations without issues, we added 1 to both numerator and denominator. It is basically a smoothing technique that evens out differences between big and small areas.

Once cleaned and grouped, we summed up the data by region and category. That created a straightforward matrix of total reported cases. It served as the foundation for charts that visualized trends in domestic, sexual, and societal crimes throughout India.

Crime_Category	Domestic Crime	Sexual Crimes	Societal Crimes
Region			
Central	8459	121515	229487
East	21241	93911	444998
Island	24	317	857
North	10314	85075	463821
North-East	1362	32089	128689
South	9929	126987	651591
West	4104	57581	355940



Fig 1: The resulting matrix (see included table) summarizes domestic, sexual, and societal crime counts by region.

Fig 2: A multi-line plot visualizes the distribution of crime types across regions, highlighting both prevalence and variation in reporting for each crime type.

To assess how well India's justice system handled crimes against women, we created several clear statistical measures from the cleaned regional data. These focused on police work and court results. Conviction Rate equaled the number of convicted cases divided by reported cases. Chargesheet Rate was the number of cases charged by police divided by reported cases. Withdrawal Rate covered cases dropped by the government divided by reported cases. Investigation Backlog Rate used pending investigations at year end divided by reported cases. Trial Backlog Rate took pending trials at year end divided by cases sent to trial. False Case Rate was cases labeled false divided by reported cases.

We built a composite measure called the severity score to capture overall judicial load and performance. Severity Score came out as 1 plus 0.5 times the pending trials at year end divided by reported cases, minus 0.3 times the convicted cases divided by reported cases. This put more emphasis on backed-up trials that strain the system, while giving credit to convictions that show progress. A higher score pointed to more delays and pileups in a region. A lower one suggested things moved along more smoothly with quicker case handling.

By computing these for every region and state, the study could point out spots where the justice system worked best. It also highlighted areas facing tough times with resolutions and backlogs. Later comparisons used these to spot trends in how responsive courts were across India.

Region	Conviction_Rate	Chargesheet_Rate	Withdrawal_Rate	Investigation_Backlog_Rate	Trial_Backlog_Rate	False_Case_Rate	Severity_Score	Annual_Case_Change
Central	0.440730	0.851896	0.317854	0.341196	2.390575	0.304914	1.999372	0.154130
East	0.257719	0.751258	0.229276	0.780994	3.753573	0.269931	2.352112	0.466610
Island	0.733132	0.942378	0.698350	0.850188	2.598395	0.698350	1.859251	0.112036
North	0.441161	0.746734	0.330603	0.511268	2.542721	0.404240	1.795691	0.098163
North-East	0.656176	0.835751	0.565013	1.105902	2.692051	0.563045	1.644650	0.158883
South	0.387132	0.790547	0.762415	0.510583	1.970360	0.775652	1.749740	0.101076
West	0.481717	0.828777	0.461044	0.652974	3.332350	0.465941	2.286989	0.105309

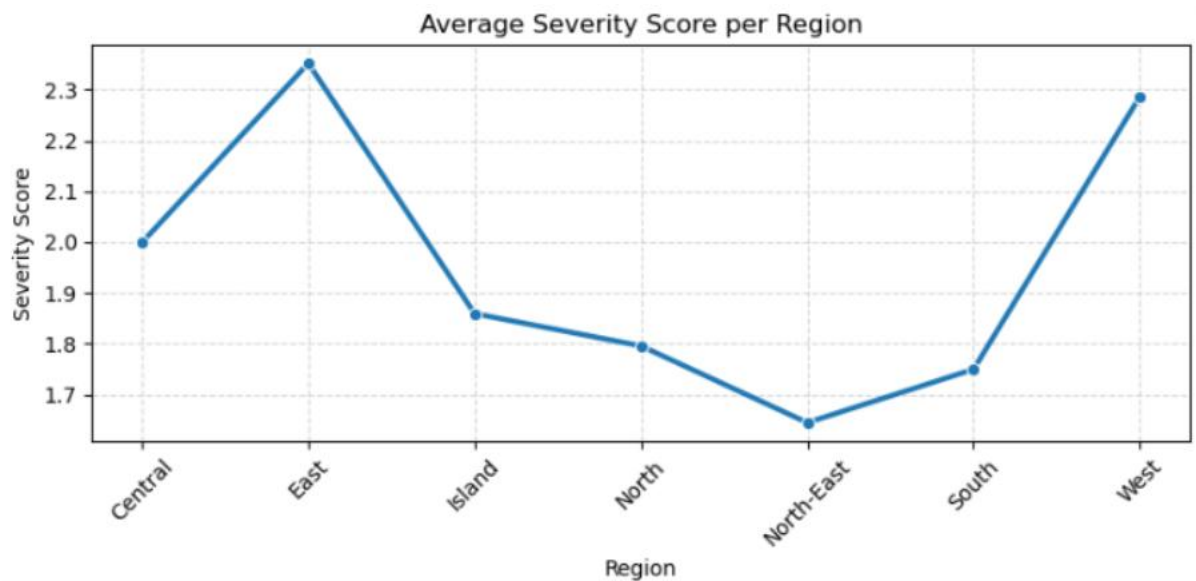


Fig: Average Severity Score by Region, India (2001–2022), illustrating inter-regional disparities in justice system burden and process efficiency.

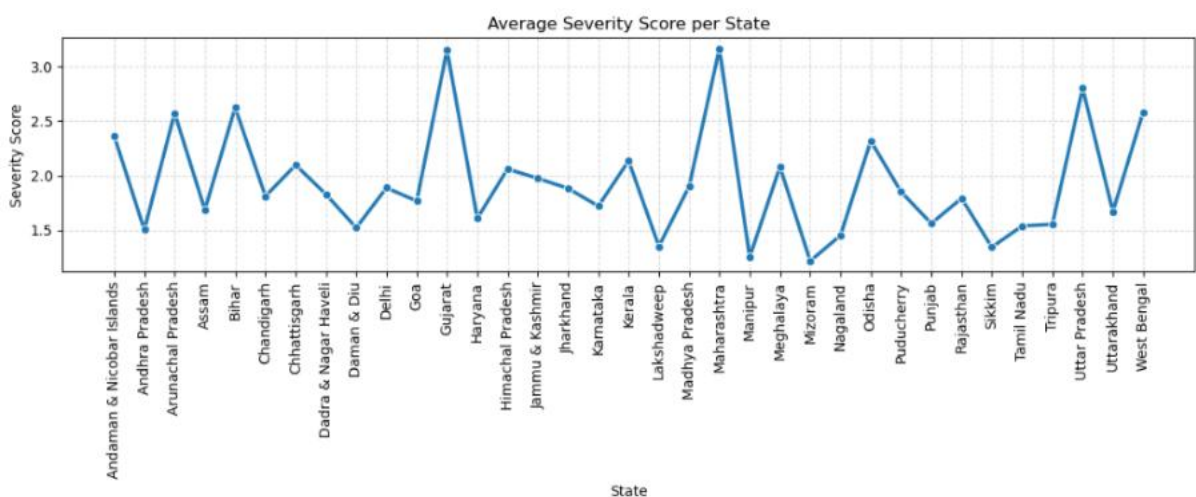
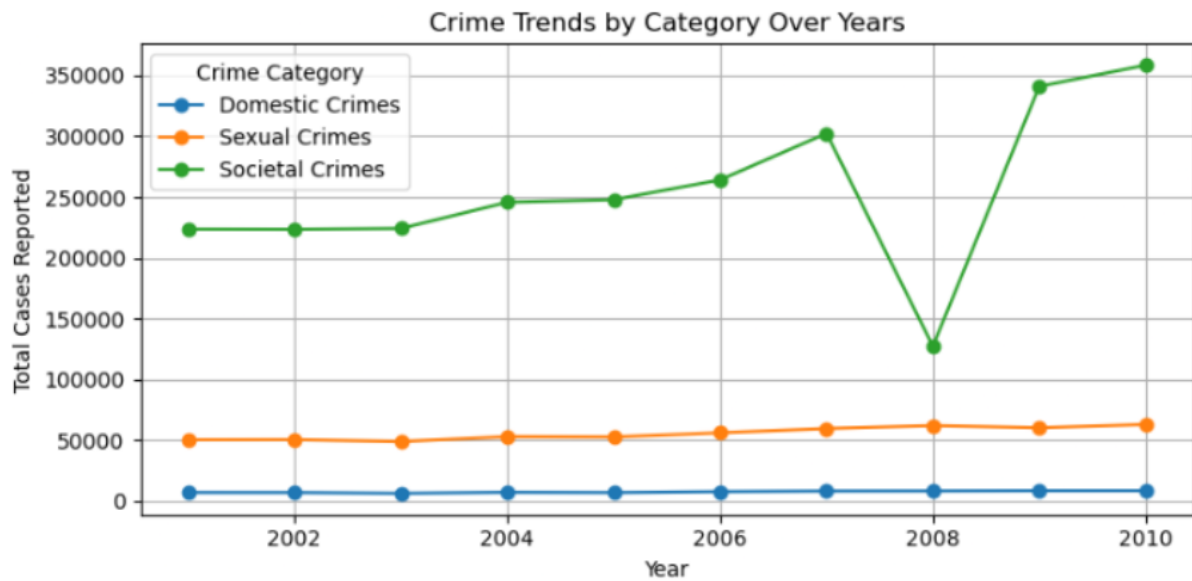


Fig: Average Severity Score per State for Crimes against Women (2001–2022). Peaks highlight states with highest judicial backlog and lowest conviction ratios.

Visualization is used to transform the raw data into meaningful patterns, trends and outliers that are usually hidden in tables. Line and bar charts are used for clarifying changes over time (trends) or across the states, which aid in both surveillance and evaluation of interventions.

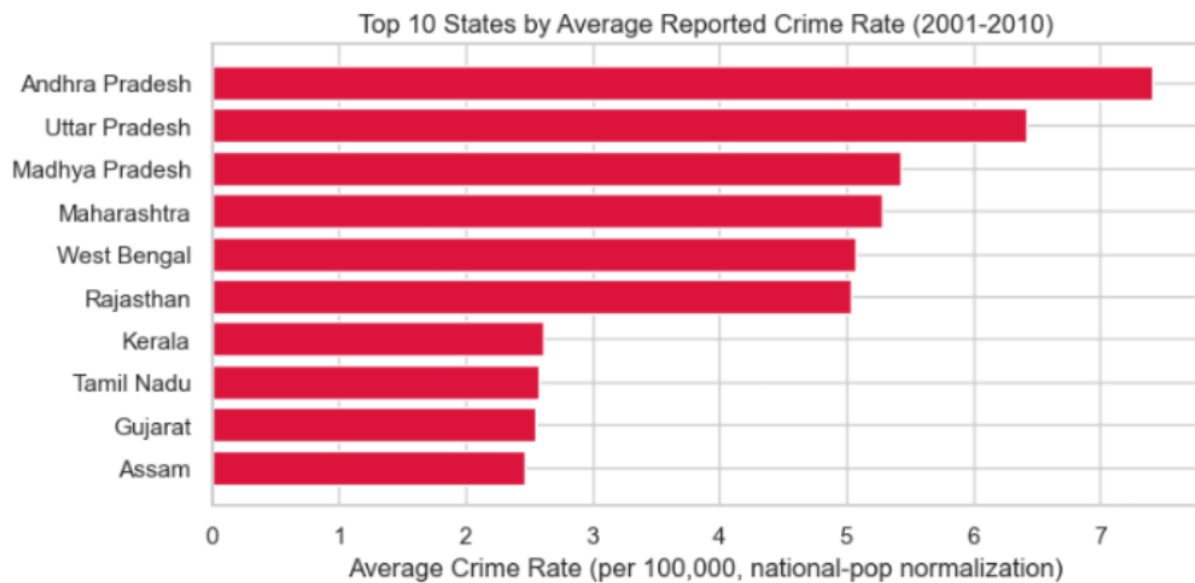


Stakeholders—including policymakers, researchers and the general public can quickly spot increases, drops, spikes, or regional disparities to respond with appropriate strategies.

Using the female population as the denominator will allow for fair year-by-year and state-by-state comparisons, as the total population changes over time and reporting areas also differ in size.

	Year	Cases_Reported	Indian_female_population	Crime_Rate
0	2001	280785	496514346	56.551236
1	2002	280734	504000000	55.701190
2	2003	279249	511500000	54.594135
3	2004	305648	519000000	58.891715
4	2005	307268	526500000	58.360494
5	2006	327799	533000000	61.500750
6	2007	370078	540000000	68.532963
7	2008	197505	547000000	36.106947
8	2009	409639	554000000	73.942058
9	2010	429745	561000000	76.603387

Crime rates per 100,000 is being used to standardize risk and exposure, which prevents large states from appearing to have more severe problems merely because of the high population counts they have. This is especially critical for crimes against women, where the at-risk group (females) is a must use as the denominator for accurate risk calculation.



State-wise and category-wise charts are made to identify geographic and type-specific hotspots, which reveal where the targeted interventions or policy responses are required the most.



Combining the vast amount of crimes by crime categories (domestic, societal, sexual) highlights the forms of violence which are most urgent and how different patterns are arising from local context and specific challenges.

National standards are used to ensure comparability with official records, published studies, and NCRB-reported statistics which make the analysis more credible and aligned with best practices. This also supports benchmarking and longitudinal studies.

We set up a Crime Control Effectiveness Score, or CCES, to make comparing states and regions simpler. This pulled together multiple justice indicators into one overall measure of performance. It rewarded strong conviction and chargesheet rates, but docked points for withdrawals, backlogs, and high severity scores.

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--- Most Effective States ---

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	Area_Name	Crime_Control_Effectiveness_Score
23	Mizoram	0.248519
18	Lakshadweep	-0.548852
29	Sikkim	-0.704467
24	Nagaland	-1.216701
31	Tripura	-1.417355
8	Daman & Diu	-1.471361
12	Haryana	-1.685183
33	Uttarakhand	-1.720335
30	Tamil Nadu	-1.960898
32	Uttar Pradesh	-1.971194

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--- Least Effective States ---

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	Area_Name	Crime_Control_Effectiveness_Score
9	Delhi	-3.836036
25	Odisha	-3.965398
0	Andaman & Nicobar Islands	-4.761477
21	Manipur	-5.458698
2	Arunachal Pradesh	-5.568890
34	West Bengal	-5.640417
11	Gujarat	-6.673590
20	Maharashtra	-6.815972
22	Meghalaya	-6.964374
4	Bihar	-6.986193

As shown in Table 1, Mizoram is the most effective state according to the composite CCES metric, scoring 0.25, while Delhi and West Bengal lag behind with scores below -5.

The formula for CCES was two times the Conviction Rate plus two times the Chargesheet Rate, minus the Withdrawal Rate, minus the Investigation Backlog Rate, minus the Trial Backlog Rate, minus the Severity Score. Those weights stressed convictions and charges as key signs of good policing and court action. A positive CCES meant the state or region handled cases pretty efficiently. A negative one signaled ongoing delays or weak management.

With this score in place, we ranked states from top to bottom in effectiveness. Smaller north-eastern ones like Mizoram, Sikkim, and Nagaland often came out strong, thanks to better conviction rates and fewer backlogs. Bigger states such as Delhi, West Bengal, Gujarat, and Maharashtra tended to rank lower, mostly from heavy trial delays and weaker conviction percentages. This method helped pinpoint where reforms or extra resources could boost justice delivery the most.

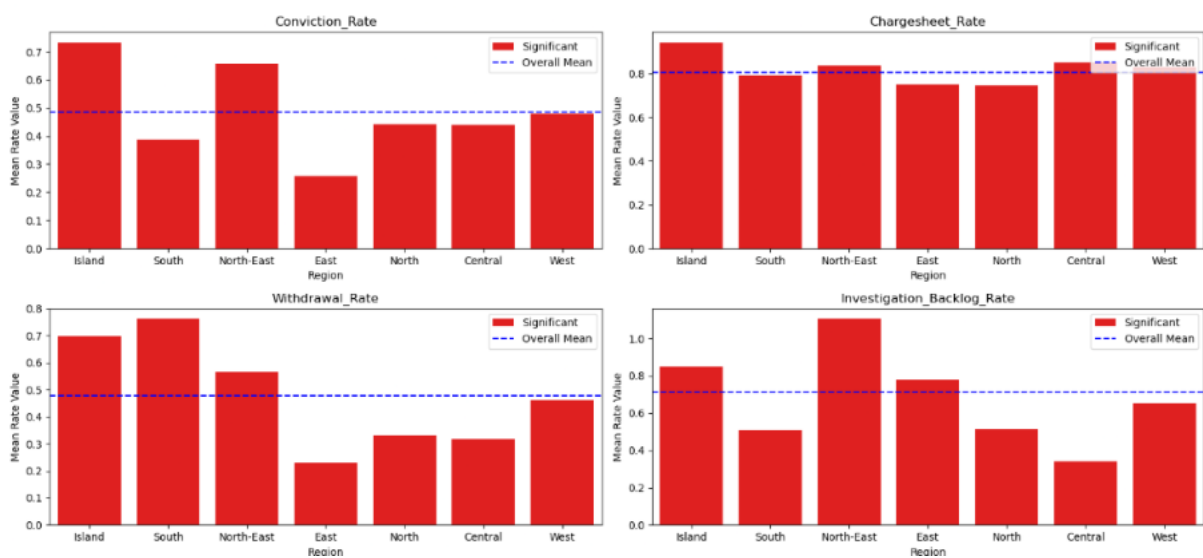
These statistical comparison tests used for significant regional disparities are key justice indicators, which ensures that the observed differences are not due to random variation but because of real, measurable inequalities. By contrasting the regional means against national averages, the analysis helps identify where certain regions stand out, helping policymakers target reforms and resources toward regions facing unique challenges or those outperforming others.

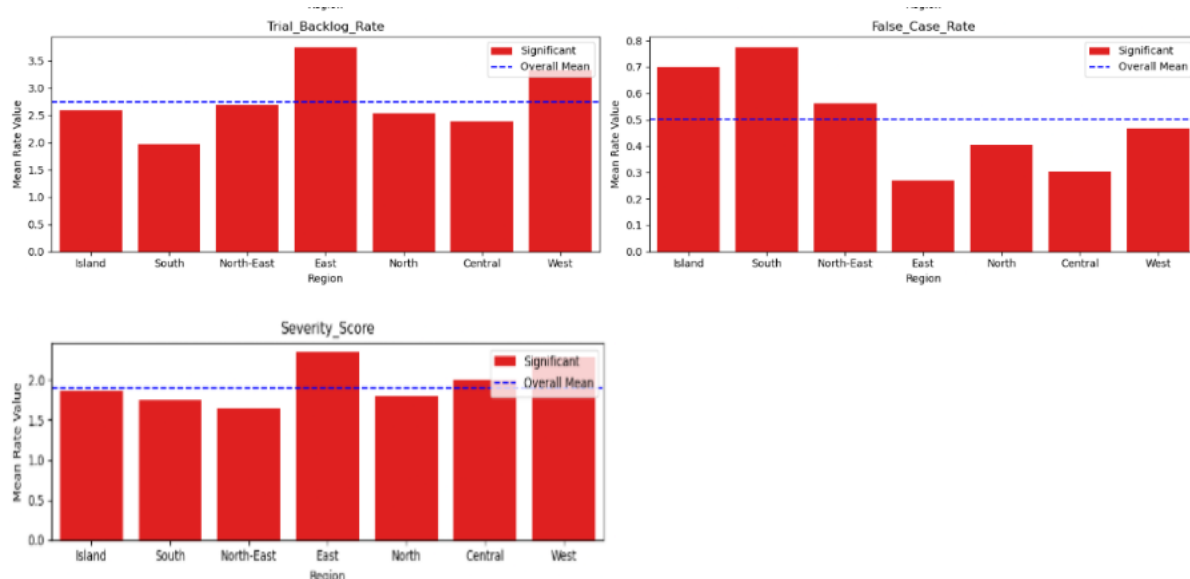
	Region	Rate	Regional_Mean	Overall_Mean	T_Statistic	P_Value	Reject_H0
0	Island	Conviction_Rate	0.733132	0.485339	9.628414	9.878262e-19	Reject H0 (Significant Difference)
1	Island	Chargesheet_Rate	0.942378	0.804414	5.573828	6.759337e-08	Reject H0 (Significant Difference)
2	Island	Withdrawal_Rate	0.698350	0.477404	8.691110	6.012827e-16	Reject H0 (Significant Difference)
3	Island	Investigation_Backlog_Rate	0.850188	0.713585	6.202514	2.452877e-09	Reject H0 (Significant Difference)
4	Island	Trial_Backlog_Rate	2.598395	2.746587	-0.705214	4.813697e-01	Fail to Reject H0 (No Significant Difference)
5	Island	False_Case_Rate	0.698350	0.500956	7.764674	2.451808e-13	Reject H0 (Significant Difference)
6	Island	Severity_Score	1.859251	1.906825	-0.616119	5.384073e-01	Fail to Reject H0 (No Significant Difference)
7	South	Conviction_Rate	0.387132	0.485339	-5.817848	9.749453e-09	Reject H0 (Significant Difference)
8	South	Chargesheet_Rate	0.790547	0.804414	-0.807979	4.194260e-01	Fail to Reject H0 (No Significant Difference)
9	South	Withdrawal_Rate	0.762415	0.477404	2.513859	1.220514e-02	Reject H0 (Significant Difference)
10	South	Investigation_Backlog_Rate	0.510583	0.713585	-12.207925	9.681888e-31	Reject H0 (Significant Difference)
11	South	Trial_Backlog_Rate	1.970360	2.746587	-12.028629	5.592366e-30	Reject H0 (Significant Difference)
12	South	False_Case_Rate	0.775652	0.500956	2.501665	1.262898e-02	Reject H0 (Significant Difference)
13	South	Severity_Score	1.749740	1.906825	-4.858091	1.518169e-06	Reject H0 (Significant Difference)
14	North-East	Conviction_Rate	0.656176	0.485339	9.457901	2.380161e-20	Reject H0 (Significant Difference)
15	North-East	Chargesheet_Rate	0.835751	0.804414	2.561737	1.056818e-02	Reject H0 (Significant Difference)
16	North-East	Withdrawal_Rate	0.565013	0.477404	5.164182	2.941258e-07	Reject H0 (Significant Difference)
17	North-East	Investigation_Backlog_Rate	1.105902	0.713585	8.927071	2.214297e-18	Reject H0 (Significant Difference)
18	North-East	Trial_Backlog_Rate	2.692051	2.746587	-0.440324	6.598026e-01	Fail to Reject H0 (No Significant Difference)

"Table X. Results of statistical tests comparing regional mean rates of crime and justice metrics against national averages for crimes against women in India (2001–2010). Significant differences are highlighted ($p < 0.05$)."

The use of hypothesis testing (with null and alternative hypotheses) provides a rigorous, objective method for validation or refutation of claims for regional equity or disparity. Visualizations help make these disparities clear at a glance, support transparent communication with stakeholders and facilitate evidence-based decision making. Ultimately, this approach guides regional policy responses, fosters accountability, and advances fairness in justice system outcomes across India.

Regional Mean vs Overall Mean with Significance Markers





"Figure Y. Regional versus national averages of conviction, chargesheet, withdrawal, backlog, false case rates, and severity scores, with statistical significance markers. Significant disparities are observed for several metrics across the Island, South, and North-East regions."

EXPERIMENTAL RESULTS:

The analysis of NCRB data of years 2001 to 2010 indicates a complex and uneven picture of crime against women across India. Once the data is cleaned, adjusted and organised into crime categories and regions, we are able to analyze different patterns.

The crimes are grouped into three categories – domestic, sexual and societal, which helped in analyzing that the societal crimes such as trafficking, abduction and indecent representation dominated throughout the decade. Whereas domestic crimes and sexual crimes were comparatively smaller in number but showed a steady increase over the years.

The crime trend showed an increase in the total reported crimes from 2001-2007, followed by a huge drop in 2008 and then a sharp increase again in 2009. Although even after adjusting the total crimes for India's female population (based on the 2001 census), this pattern remained the same suggesting an actual real change rather than random fluctuation.

At the state level, large states like Andhra Pradesh and Uttar Pradesh consistently reported the highest number of cases while small states and territories like Lakshadweep, Sikkim and Puducherry showed the lowest.

For a better and clear comparison we introduced some indicators like Conviction rate which indicates high rates (above 50%) in many North-Eastern and Island states but as low as 25% in states like Bihar and Uttar Pradesh. Chargesheet rate was high almost everywhere, usually around 70% or above. Backlog rates for both police investigation and court trials were high especially in the Eastern and Western regions.

Regional analysis points out that severity score (severity score has helped summarize all the important indicators we have using a single score) in the Eastern and Western regions showed the highest average severity scores, which concludes towards (as per the formula) high caseloads and backlog rates. Whereas the Northeast and South region showed the lowest severity scores. At state level Gujarat and Maharashtra had the highest severity scores in comparison to Mizoram, Manipur,

Lakshadweep where the severity score was the lowest. Most populous states, such as Uttar Pradesh and West Bengal indicated a close severity score to the average severity score.

To measure the overall effectiveness of the justice system, a (CCES) Crime Control Effectiveness Score was developed, which combined conviction rate, chargesheet rate, backlogs and severity score. As a result Mizoram came out on top with a positive CCES score. Sikkim, Nagaland, Daman & Diu also performed well but in contrast Delhi, West Bengal, Gujarat, Maharashtra, Bihar performed poorly, meaning they have lower conviction and chargesheet rates but higher backlogs.

To make sure these indicators and their results aren't just random, we also applied statistical tests. The null hypothesis assumed no difference between regional and national averages, while the alternative proposed that there was one. The results came out very clear: for most indicators, especially for Conviction rate, Chargesheet rate and Backlog rate, the null hypothesis was rejected at the 5 % level of key indicators, which means the differences were real and statistically significant. The Island and North-Eastern regions performed better than the national average while the east and west regions showed weak results.

DISCUSSION:

The patterns of this study signifies that the crimes against women are not the same across India. It shows different patterns across regions, crime types and states. Societal crimes like trafficking and abduction were on top every year which shows that the problem is not just legal but also structural and social. Domestic and sexual crimes were comparatively less but they increased gradually over the years. The sudden drop in 2008 and again the rise in 2009 was an unexpected discovery. It might not be because of the reduction in crime but because of changes in reporting or data management.

State wise analysis highlights the impact of population density, administrative capacity and institutional effectiveness on justice delivery. Smaller and less populous states generally show higher conviction and chargesheet rates and lower backlogs likely due to their smaller caseloads and simpler bureaucratic systems. Meanwhile, larger and more dense states indicate quite the opposite. They face challenges during converting the chargesheets into convictions as they show average chargesheet rates but low conviction rates. This indicates that justice effectiveness depends not only on reporting or investigating but also on procedural efficiency, resource allocation and judicial capacity.

Severity score and CCES Crime Control Effectiveness Score provides a framework where we can compare the regional and state wise performance. These indicators highlight that high caseloads do not necessarily translate to poor performance, but when coupled with high backlogs and low convictions, they tend to reveal a weak institutional performance. Both Backlogs also perform a crucial role when we are discussing the justice outcomes. As we can see West Bengal and Delhi perform averagely in severity score but in CCES they perform poorly meaning the backlog rates are pretty high there indicating procedural delays rather than high number of crimes alone.

From all these points, we can say that crime and justice are not just numbers, they depend on how a state manages its system, population and resources. The statistical tests also prove that these regional differences are actually significant and not just random. This shows that our country requires policies and institutional measures that are responsible for regional disparities, population density and administrative capacity. Improvements in capturing the data and its management, judicial efficiency and law enforcement coordination are crucial so that the reported cases are effectively investigated.

CONCLUSION:

This study shows, crimes against women in India from 2001-2010 are uneven across states and regions. Societal crimes are prevalent and other crimes like Domestic and Sexual crime are increasing year by year.

Smaller regions generally handle cases and backlogs more effectively with higher conviction rates and lower backlogs. In contrast larger and more populous states which are also considered more developed and contain tier-1 cities face challenges in converting the chargesheets into convictions. It shows that the justice process in larger regions is more burdened and can be considered less efficient. The indicators like severity score and CCES highlight these differences clearly. They also show that performance depends not only on how many crimes are reported, but also on how fast and effectively the system processes them to punish the criminals.

In conclusion, our country needs stronger systems, faster courts and better data handling so that every reported case is lead to justice.