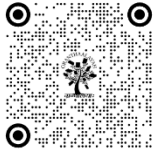


ADDRESSING GENDER-BASED VIOLENCE BY ANALYZING CRIMES AGAINST WOMEN IN INDIA (2001–2021) FOR A VIKSIT BHARAT 2047

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ABSTRACT

Gender-based violence remains a significant barrier to achieving gender equality in India with crimes against women consistently increasing over the years. As India envisions becoming Viksit Bharat by 2047 addressing gender inequality and combating gender-based violence are critical priorities. Crimes against women not only hinder social progress but also undermine the nation's potential for inclusive growth. In 2023, India ranked 128th position among 177 nations on the Women, Peace and Security (WPS) Index, achieving a score of 0.595 on a scale of 1. This research highlights the alarming trends and patterns of crimes against women in India between 2001 and 2021 offering evidence-based insights for researchers and activists. While existing literature highlights the challenges of gender-based violence, there is limited research that integrates 20 years of crime data with actionable insights for activists and stakeholders. This study fills that gap by offering a state-wise and category-specific analysis of crimes using a visual dashboard contributing to the goal of building a developed and equitable India by 2047. The objective of this research is to analyse two decades of crime data to uncover trends, identify high-incidence states and crime types and evaluate systemic factors like legal effectiveness and public awareness. A dataset on crimes against women in India was sourced from Kaggle covering the years 2001 to 2021. Data preprocessing and analysis were conducted using Microsoft Excel focusing on key metrics such as total crime volume, crime rates per 100,000 women, conviction rates and response times. This research underscores the need for robust, region-specific policies to address gender-based violence emphasizing law enforcement efficiency and public awareness.

Keywords: Gender, Violence, Women, Dashboard, Crime, Trends, Viksit Bharat 2047, Data Visualization

1. INTRODUCTION

Gender-based violence remains a critical issue in India with crimes against women persisting as a significant challenge to social progress and gender equality [1]. This introduction examines the landscape of crimes against women in India from 2001 to 2021, providing insights into the trends, patterns and implications for the nation's development goals [2]. The prevalence and types of offenses perpetrated towards females in India have evolved over the past two decades, reflecting changes in societal attitudes, legal frameworks and reporting mechanisms [3].

By analyzing comprehensive data from sources such as the National Crime Records Bureau (NCRB) and state police departments [4], we can gain a nuanced understanding of various crime categories including rape, domestic violence, dowry deaths and human trafficking:

- In 2020, a total of 371,503 cases of crime against women were registered across India.

- Experts suggest that official statistics likely underestimate the true extent of the problem because of societal pressure, fear of backlash and distrust in the legal system.
- In 2020, about 28% of rape victims were under 18 years of age.
- The National Family Health Survey-5 (2019-21) indicates that about 30% women between the ages of 18 and 49 have faced physical abuse at some point since their teenage years with the majority of perpetrators being husbands.
- In 2024, Uttar Pradesh registered the highest number of complaints with the NCW followed by Delhi and Maharashtra.
- The crime rate against women was recorded at 66.4 incidents per lakh population with a charge sheet filing rate of 75.8 in these cases.

The research on crimes against women in India from 2001 to 2021 remains highly relevant in 2025 due to several factors [5]. Firstly, the data provides a comprehensive two-decade overview allowing for the identification of long-term trends and patterns that continue to shape current policies and interventions [6]. Secondly, the analysis of regional disparities and socio-economic factors offers valuable insights for ongoing efforts to address gender-based violence across diverse Indian states. The study's findings continue to inform the development of targeted strategies aligned with India's evolving gender equality goals and international commitments. The historical data enables researchers to assess the impact of technological advancements and societal changes on reporting mechanisms and support systems for victims [7]. The study's insights into the correlation between crime rates and socio-economic indicators remain relevant for addressing persistent structural inequalities.

2. LITERATURE SURVEY

Table 1 Literature Survey

<i>Paper</i>	<i>Findings</i>	<i>Methodology</i>	<i>Research Gap</i>
Suba, C. (2024). CRIMES AGAINST WOMEN IN INDIA: AN ANALYTICAL STUDY. <i>ShodhKosh: Journal of Visual and Performing Arts</i> , 5(1), 2553–2558. https://doi.org/10.29121/shodhkosh.v5.i1.2024.2658	High levels of violence against women in India and need for improved laws to prevent crimes against women.	Detailed exploration of different aspects of crimes targeting females in India	Lack of comprehensive evaluation of the effectiveness and enforcement of laws addressing crimes against women in India.
<i>Exploratory Data Analysis on "Crime against Women in India from year 2001– 2021."</i> (n.d.). https://doi.org/20.14118.AJ.2024.V13I4.2335	Increased reporting trends in India	Exploratory Data Analysis	Need for consistent regional data
Pooja BS, Guddattu V and Rao KA (2024) "CRIME AGAINST WOMEN IN INDIA: DISTRICT-LEVEL RISK ESTIMATION USING THE SMALL AREA ESTIMATION APPROACH. <i>Front. Public Health</i> 12:1362406. doi: https://doi.org/10.3389/fpubh.2024.1362406	Increase in crime rate and sex ratio and population density impact crime.	Ecological analysis of NCRB data (2020-2022), small area estimation, hotspot analysis and spatial regression	Limited focus on causative mechanisms and interventions in identified high-risk hotspots.

S. Kumar and V. Naik, "Geospatial Analysis of Crime Against Women," <i>2023 14th International Conference on Computing Communication and Networking Technologies (ICCCNT)</i> , Delhi, India, 2023, pp. 1-7, 2023, doi: 10.1109/ICCCNT56998.2023.10307896.	Identified spatial patterns and hotspots of women-based crimes.	Advanced visualization techniques for clear presentation	Lack of studies integrating geospatial analysis with socio-economic factors
Ghosh, Rimpa and Sengupta, Sarbajit, <i>Impact of changes in law on reporting of crime: An analysis of external and internal crime against women in India</i> . (November 15, 2023). Available at SSRN: https://ssrn.com/abstract=4634205 or http://dx.doi.org/10.2139/ssrn.4634205	Impact of Domestic Violence Act 2005 on crime reporting	Time-series analysis	Variability in data collection
Geetika Bhardwaj and R. K. Bawa, ASSAYING THE STATISTICS OF CRIME AGAINST WOMEN IN INDIA USING PROVENANCE AND MACHINE LEARNING MODELS <i>International Journal of Advanced Computer Science and Applications(IJACSA)</i> , 13(7), 2022. http://dx.doi.org/10.14569/IJACSA.2022.0130760	Random Forest achieved the highest accuracy (above 90%) for analysing women's crime patterns.	Standardized NCRB and Kaggle data, applied Random Forest and Gradient Boosting models.	Inconsistent data formats and limited use of advanced deep learning.

3. METHODOLOGY



Figure 1 Methodology Followed for the Research

1) Data Collection

This focuses on gathering both primary and secondary data to form the foundation of our analysis.

Primary Data Collection

- Data was collected via a Google Form shared across platforms like WhatsApp and LinkedIn getting 175 responses. Respondents included both male and female participants.

- Collected insights on priority areas like crime categories, awareness initiatives, dashboard feature preferences and relevance to the "Viksit Bharat 2047" vision.

Secondary Data Collection:

- Downloaded datasets from NCRB & Kaggle with comprehensive crime statistics categorized by state and crime type (2001–2021).
- Verified and cleaned the dataset for consistency and accuracy before analysis.

Data Integration and Preparation:

- Merged primary and secondary data to create a unified dataset.
- Filtered irrelevant data and categorized crime types for dashboard visualization.

2) Dashboard Development

We focused on creating an interactive and user-friendly dashboard using Microsoft Excel to visualize and analyse the collected data.

Tools and Features:

- Used pivot tables, charts and slicers to enable filtering and slicing by year, state and crime category.
- Incorporated heatmaps, bar charts and line graphs to visualize trends and state-wise distributions of crimes.

Dashboard Components:

- State-wise crime trends and statistics.
- Year-on-year changes in crime rates.
- Specific crime category breakdowns (e.g., dowry deaths, women trafficking).

Testing

- Conducted internal testing to ensure the dashboard is user-friendly and functional.
- Gathered feedback from users (mentors and peers) to improve the design and usability.

Analysis and Insights Generation

This stage focuses on interpreting the data to derive actionable insights and align findings with the research objectives.

Key Performance Indicators (KPIs) Evaluation:

- Total number of crimes against women reported during the 20-year period.
- Crime rate per 100,000 women.
- Year-on-year percentage change in crime rates.
- Conviction rates and effectiveness of the legal system.

Insights Extraction:

- Identified top contributing states (e.g., Uttar Pradesh, West Bengal) and categories of crimes (e.g., rape, domestic violence).
- Analysed regional disparities and socio-economic factors influencing crime rates.
- Highlighted gaps in law enforcement and public awareness initiatives.

Alignment with Viksit Bharat 2047:

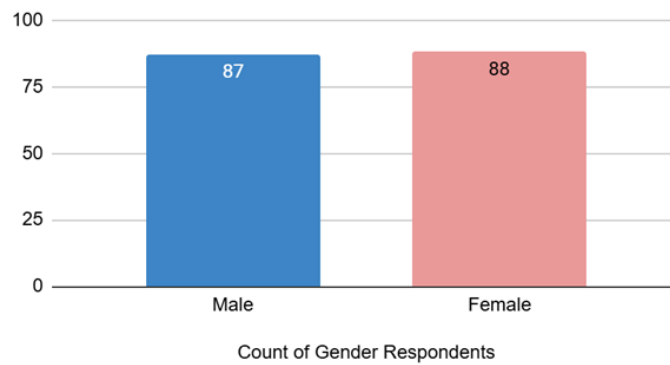
- Evaluated how reducing crimes against women and enhancing safety contributes to India's development goals.

4. DATA COLLECTION

1) Survey Analysis

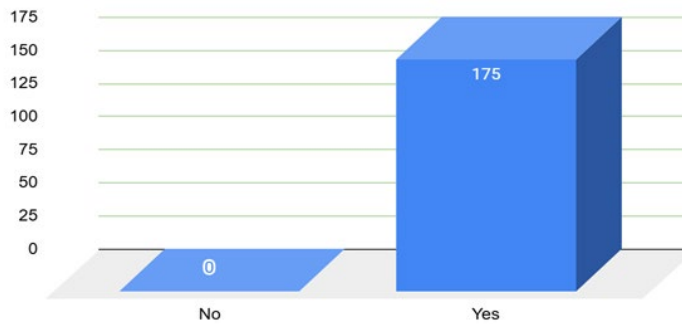
The data collection for this research involved both primary and secondary sources to ensure a comprehensive understanding of crimes against women in India. A Google Form survey was designed to capture public perceptions and recommendations which was shared through platforms like WhatsApp and LinkedIn.

Count of Respondents (Gender Based)



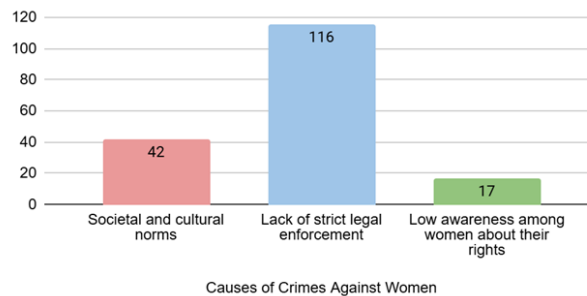
The survey received 175 responses with an almost equal distribution across genders where 88 female respondents (50.3%) and 87 male respondents (49.7%). This balanced demographic representation allowed for diverse perspectives on the issue enriching the analysis with insights from both genders.

1. Do you believe crimes against women have increased over the past two decades?



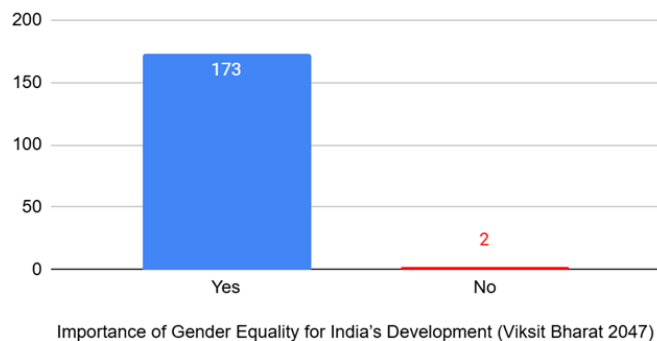
One of the key survey questions aimed to gauge public perception of whether crimes against women have increased over the past two decades. Among the 175 respondents, a unanimous 100% (175 individuals including male and female) answered "Yes", indicating a strong consensus that crimes against women have significantly risen during this period. This finding underscores the urgent need for targeted interventions and comprehensive strategies to address this critical issue.

2. In your opinion, what is the most common cause of crimes against women in India?



A survey question aimed to identify the perceived causes of crimes against women in India revealed that the majority, 66.3% (116 respondents), believe lack of strict legal enforcement is the primary cause. Additionally, 24% (42 respondents) attributed it to societal and cultural norms, while 9.7% (17 respondents) cited low awareness among women about their rights. This indicates a pressing need to educate women about their legal protections and empower them to seek justice. These insights highlight the need for stronger legal frameworks, cultural reforms and awareness campaigns to address the issue effectively.

3. Do you believe that achieving gender equality and addressing gender-based violence is crucial for India's development (Viksit Bharat 2047)?

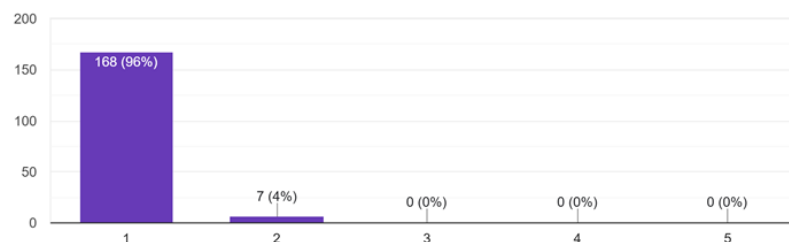


The survey also explored the public's view on the importance of achieving gender equality and addressing gender-based violence for India's development, particularly in the context of the Viksit Bharat 2047 vision. A vast majority agreed that ensuring safety and equal opportunities for women will significantly boost the country's progress. The results showed a strong consensus, with 98% (173 respondents) answering "Yes" affirming that gender equality is crucial for India's progress. A vast majority agreed that ensuring safety and equal opportunities for women will significantly boost the country's progress. Only 1.1% (2 respondents) disagreed, underlining the widespread recognition of the link between gender equity and national development.

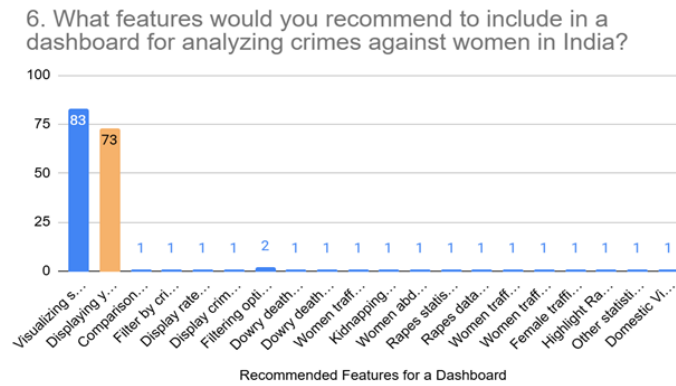
When asked about the biggest barrier to reporting crimes against women, the majority of respondents, 60.6% (106 respondents) identified lack of trust in law enforcement as the primary obstacle. This was followed by fear of social stigma which 36% (63 respondents) considered the biggest barrier. A smaller proportion, 3.4% (6 respondents) cited unawareness of reporting mechanisms. These findings underscore the need for reforms in law enforcement and societal attitudes to encourage reporting and support victims of crimes.

5. How necessary do you think an interactive dashboard is for understanding and addressing crimes against women in India?

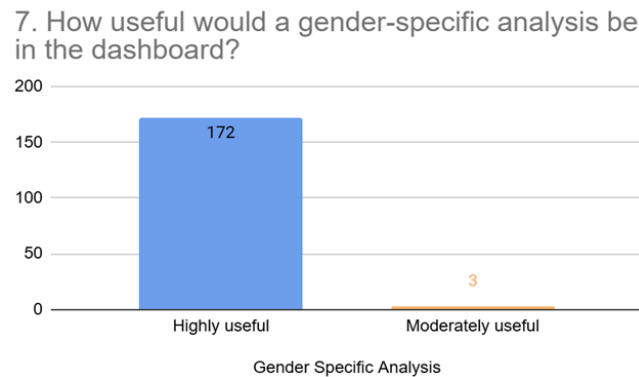
175 responses



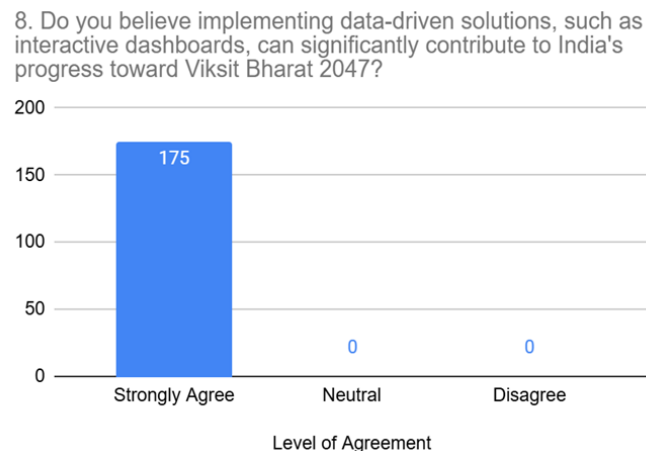
The survey assessed the perceived necessity of an interactive dashboard for understanding and addressing crimes against women in India. An overwhelming majority, 96% (168 respondents) rated it as highly necessary (1 on the scale), while 4% (7 respondents) also acknowledged its importance but to a slightly lesser degree (2 on the scale). This strong support highlights the value of such a tool in enhancing data visualization, identifying trends and facilitating informed decision-making to address crimes against women effectively.



The survey highlighted key features for an effective dashboard, with 47.4% recommending state-wise crime trend visualization and 41.7% suggesting year-on-year crime comparisons. Other important features included filtering by regions, showcasing specific crime categories like domestic violence, rape and trafficking and providing insights into dowry deaths and kidnapping statistics. These inputs underline the need for a detailed and interactive tool to analyze and address crimes against women comprehensively.



Out of 175 responses, the majority, 98.3% (172 respondents), considered gender-specific analysis to be highly useful. Only 1.7% (3 respondents) found it to be moderately useful while none deemed it not useful. This highlights a strong preference for incorporating gender-specific insights into the dashboard.



All 175 respondents (100%) strongly agreed that interactive dashboards and data-driven solutions are essential for India's progress toward Viksit Bharat 2047. This unanimous response highlights the importance of leveraging

technology and data for effective decision-making. No respondents chose neutral or disagree, indicating widespread confidence in these solutions. It emphasizes the role of data analytics in achieving national development goals.

Existing Scenario

The current scenario of offenses directed at women in India is both intricate and concerning. According to official records, the incidence of such crimes has steadily increased over the years, with notable spikes in specific years like 2014 and 2021. States like Uttar Pradesh, West Bengal and Rajasthan contribute significantly to the overall statistics, whereas regions like Lakshadweep and the Andaman & Nicobar Islands report lower crime rates. However, this disparity often reflects variations in reporting mechanisms, public awareness and law enforcement effectiveness rather than an actual difference in crime prevalence.

The legal system, while robust in its framework, faces challenges in enforcement and timely justice delivery. Conviction rates remain low and response times are often delayed, diminishing the deterrent effect of existing laws. Moreover, public awareness campaigns and support systems for victims are unevenly distributed across states leaving many women unaware of their rights or hesitant to report crimes due to social stigma.

Given this backdrop, the integration of data analytics through dashboards is critical for addressing these gaps. Such tools can provide real-time insights into trends, highlight high-risk areas and track the effectiveness of policies and interventions. In 2025, as India increasingly adopts digital solutions to enhance governance, a data-driven approach to combating crimes against women is not just relevant but essential to creating a safer and more equitable society.

5. IMPLEMENTATION



Figure 2 Basic Flow Diagram

1) Data Collection

- Gather dataset from Kaggle and NCRB (National Crime Records Bureau).
- Dataset includes:

State/UT

Year

Recorded Cases of Rape

Kidnapping and Disappearance

Deaths Linked to Dowry Practices

Cases of Physical Assault Against Women

Violations of Women's Modesty
 Instances of Domestic Abuse
 Trafficking Involving Women
 Total Crimes

State	Year	No. Of Rape Cases	Kidnapping and Abduction cr.	Dowry Deaths	Assault against Women	Assault against Modesty of Women	Domestic Violence	Women Trafficking	Total
ANDHRA PRADESH	2001	871	765	420	3544	2271	5791	7	13669
ARUNACHAL PRADESH	2001	33	55	0	78	3	11	0	180
ASSAM	2001	817	1070	59	850	4	1248	0	4048
BHARAT	2001	808	518	559	902	21	1558	53	4455
CHHATTISGARH	2001	959	171	70	1763	161	840	0	3964
GOA	2001	12	6	2	17	7	11	0	55
GUJARAT	2001	288	887	67	756	111	3667	0	5744
HARYANA	2001	298	297	285	478	401	1513	0	3372
HIMACHAL PRADESH	2001	124	105	10	310	14	317	0	880

Figure 3 Dataset

2) Data Processing

- Clean and preprocess the dataset using MS Excel.
- Remove duplicates, handle missing data and structure data for visualization.
- Ensure all crime metrics are in consistent formats and linked to specific states/UTs and years.

3) Dashboard Creation

Home Page:

- Add a slicer for states and UTs to filter data dynamically.
- Display real-time statistics for selected regions (e.g., total crimes, most frequent crime types).

Dashboard Page:

- Visualize data using multiple chart types:
- **Pie Chart:** Proportional distribution of crime categories.
- **Clustered Column Chart:** Yearly trends and state comparisons.
- **Donut Chart:** State-wise breakdown of specific crime types (e.g., rape, domestic violence).
- **3D Stacked Column Chart:** Cumulative crime trends across years.

4) Insights and Reporting

- Highlight trends, disparities and key findings such as top contributing states, years and crime categories.

Tools Used

MS Excel:

- Data preprocessing and cleaning.
- Building the dashboard with slicers and visualizations.

Datasets:

- Kaggle and NCRB datasets with detailed crime data spanning 2001–2021.

6. RESULTS AND DISCUSSION

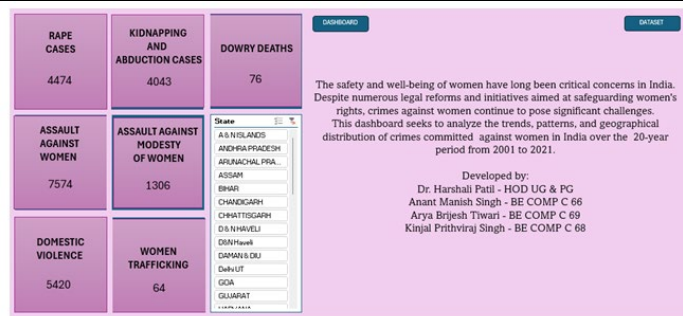


Figure 4 Home Page for the Dashboard

The home page serves as the landing interface providing a slicer for selecting states and union territories to view crime statistics. Upon selecting a specific state user are directed to real-time data visualizations reflecting crime trends and distribution in that region.

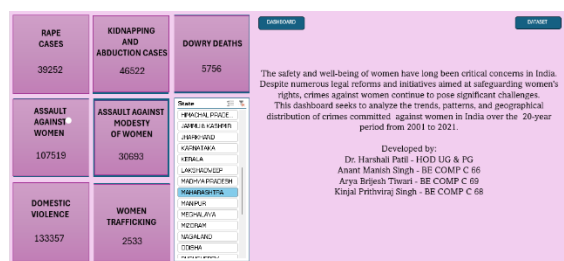


Figure 5 Statistics of Maharashtra After Clicking on the Slicer

After selecting Maharashtra, the dashboard reveals its total reported crimes, highlighting key categories such as rape, domestic violence and dowry deaths. Maharashtra ranks among the top states in crimes against women with a significant contribution from cases of domestic violence.

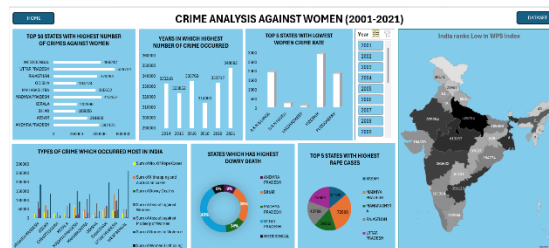


Figure 6 Dashboard

The dashboard provides an interactive and comprehensive view of crimes against women across India using various visualization tools like pie charts, bar graphs and stacked columns. Users can explore trends, state-wise comparisons and category-specific data, offering actionable insights for policymakers and researchers.



Figure 7 Total Crimes Against Women in India (2001–2021)

This figure displays the trend of total crimes against women in India over two decades. It highlights a steady increase with noticeable spikes in specific years such as 2014 and 2021.

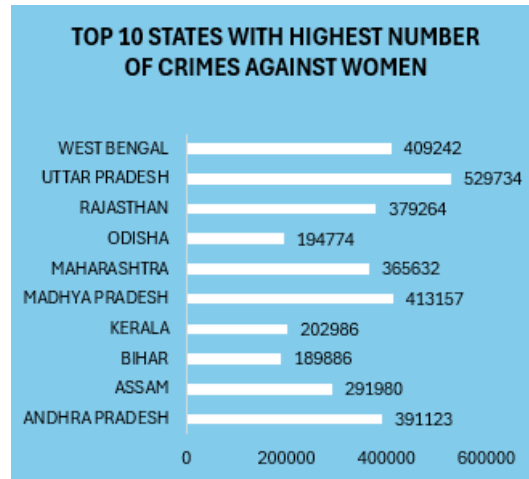


Figure 8 State-Wise Distribution of Crimes Against Women

A Clustered Bar chart showing the total number of crimes reported across states in India. Uttar Pradesh leads with the highest number of crimes.

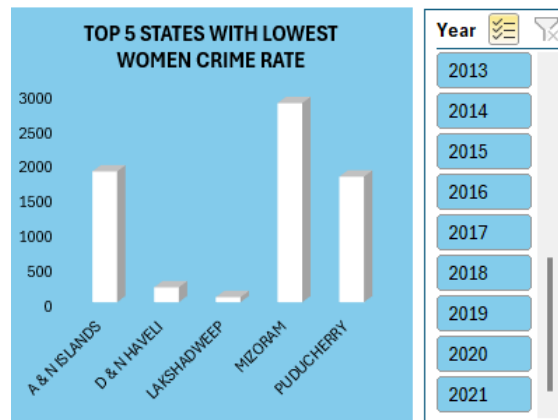


Figure 9 UT & State-Wise Distribution of Crimes Against Women

This 3D Stacked Column figure showcases the total number of crimes against women across Union Territories in India over two decades. The multi-selected slicer highlights specific UTs revealing the comparatively lower crime numbers in regions like Lakshadweep (72) and Dadra & Nagar Haveli (212).

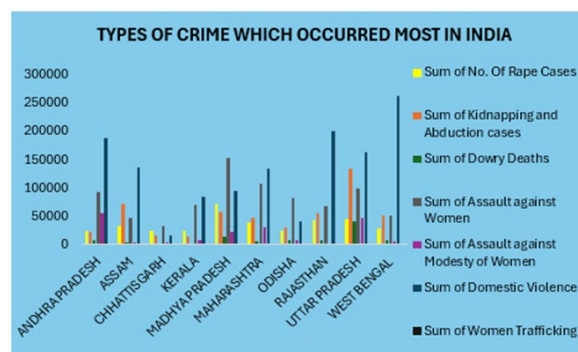


Figure 10 Types of Crimes Reported in India

This Clustered Column data reveals the prevalence of various crimes against women across states highlighting Uttar Pradesh with the highest number of dowry deaths (40,615) and kidnapping cases (133,856), while Madhya Pradesh records the highest rape cases (72,808) and assaults against women (152,000). States like Kerala and Assam show significant numbers in domestic violence and abductions, respectively indicating region-specific challenges that require targeted interventions.

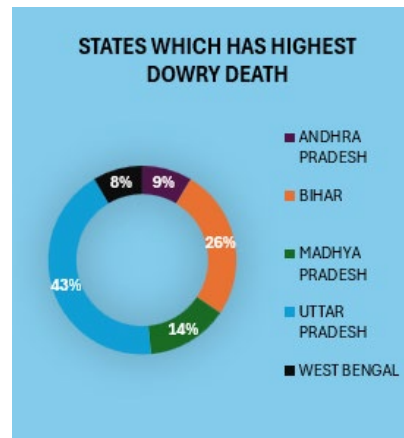


Figure 11 Top 5 States with Highest Dowry Deaths

The doughnut chart highlights Uttar Pradesh with the highest number of dowry deaths constituting 43% of 40,615 cases significantly surpassing other states. Bihar had a total of 24,428 i.e. 26% dowry deaths indicating a critical need for stricter law enforcement and societal change in the region. West Bengal had 8,075 dowry deaths reflecting a concerning number that calls for enhanced public awareness and stronger legal measures.

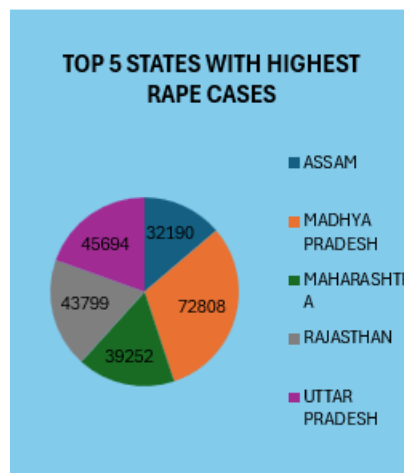


Figure 12 Top 5 States with Highest Rape Cases

The pie chart reveals that Madhya Pradesh reported the highest number of rape cases (72,808) over the last two decades accounting for a significant portion of the total. Uttar Pradesh reported 45,694 rape cases marking it as one of the highest contributors to the total rape cases in India. Rajasthan saw 43,799 rape cases emphasizing a serious concern for women's safety in the state. Maharashtra recorded 39,252 rape cases contributing notably to the national statistics on crimes against women.

7. KEY GOVERNMENT INITIATIVES

Gender equality is a key pillar of Viksit Bharat 2047. It goes beyond being a mere slogan and serves as a core value essential for the comprehensive progress of the nation [8]. In order to combat crimes against women and strive toward a "Viksit Bharat" by 2047, the Indian government has launched a number of programs in recent years.

1) Key Government Initiatives to Empower Women Nationwide and Strengthen Judicial System

- **Nirbhaya Fund:** Established to support projects enhancing women's safety, the Nirbhaya Fund has been instrumental in financing various initiatives aimed at reducing crimes against women. Through 2025–2026, the Umbrella Scheme on "Safety of Women" will be sustained with funding from the Nirbhaya Fund. The Nirbhaya Fund would contribute Rs 294.23 crore of the scheme's Rs 1,179.72 crore total cost [9].
- **One Stop Centres (OSCs):** Under the 'Sambal' sub-scheme of 'Mission Shakti,' OSCs provide integrated services such as police facilitation, medical aid, legal counselling and temporary shelter to women affected by violence [10]. Since they started in April 2015, OSCs have helped more than 9.19 lakh women as of May 24, 2024. Addresses and other details about Andhra Pradesh's OSCs may be found on the Mission Shakti website.
- **SHe-Box Portal:** Launched to address sexual harassment at workplaces, the SHe-Box portal allows women to file complaints and track their status ensuring timely redressal. The Supreme Court has directed the establishment of Internal Complaints Committees across all government offices and public sector undertakings to ensure the proper implementation of the Sexual Harassment of Women at the Workplace Act [11]. It mandates the formation of Local Complaints Committees and the creation of 'SheBox' portals for lodging complaints with a deadline for compliance set for March 31, 2025.
- **Fast-Track Special Courts (FTSCs):** To expedite trials of sexual offenses, the government established FTSCs, aiming to reduce the backlog of cases and deliver swift justice [12]. By October 2024, FTSCs had resolved over 2,87,000 cases that were still ongoing. 94% of cases involving sexual offenses were resolved by FTSCs in 2023.
- **Criminal Law (Amendment) Act, 2018:** This act introduced stricter penalties for sexual offenses including the death penalty for certain cases to deter crimes against women. In reaction to the rape cases in Kathua and Unnao, the CLAA was passed. The goal of the CLAA was to discourage crimes against children. On July 30, 2018, the Lok Sabha passed the CLAA and on August 6, 2018, the Rajya Sabha did the same. The CLAA imposed the death penalty for rape of girls under 12 years of age [13].

8. CONCLUSION AND FUTURE SCOPE

Low conviction rates and delays in law enforcement responses are barriers to justice in high-crime states. The dashboard provides a comprehensive examination of the alarming trend of gender-based violence in India over the past two decades. The development of an interactive dashboard built using MS Excel and data sourced from Kaggle and the National Crime Records Bureau (NCRB) aims to shed light on critical patterns and trends in crimes such as rape, dowry deaths and domestic violence. The dashboard serves as a valuable tool for policymakers, researchers and activists, allowing them to analyze state-wise crime statistics and identify regions with the highest need for intervention. The findings underscore the need for urgent action to address the increasing prevalence of crimes against women, especially in states like Uttar Pradesh, Maharashtra and Madhya Pradesh. The dashboard not only helps track the effectiveness of these initiatives but also enhances the understanding of their impact on crime reduction. Government initiatives have been pivotal in addressing gender-based violence but the data highlights that these measures need to be strengthened further to curb the rising crime rates.

Looking ahead, the future scope of this project lies in expanding the dashboard to include real-time data, machine learning algorithms for predicting crime hotspots and more detailed crime categories. This will support the government's vision of a Viksit Bharat 2047 where gender equality, safety and empowerment of women are integral to the nation's development. Additionally, further research into the effectiveness of current government initiatives, coupled with public engagement could help reduce crime rates and lead to safer environments for women in India.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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