Original Article
ISSN (Online): 2582-7472

ShodhKosh: Journal of Visual and Performing Arts
July-December 2023 4(2), 5014–5028

ROLE OF INFORMATION TECHNOLOGY IN STRENGTHENING WOMEN'S SAFETY IN INDIA: AN ANALYTICAL STUDY

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ABSTRACT

Women's safety remains a pressing concernm with rising incidents of gender-based violence despite advancements in law enforcement. 445,256 crimes against women were reported in 2022 showing a 12.9% rise from 2018. Technology-driven solutions such as mobile safety applications, wearable devices and AI-based surveillance, offer promising interventions. However, gaps persist in public awareness, usability, real-time police integration and trust in these technologies. Existing research lacks comprehensive evaluations of their effectiveness and user concerns. This study examines the adoption, perception and impact of technology-based safety solutions for women, using survey data and testimonials to assess real-world effectiveness. Findings indicate that while awareness of such tools is increasing, concerns over data privacy, reliability and law enforcement responsiveness hinder widespread adoption. Mobile safety apps and wearables emerged as the most trusted solutions, yet respondents emphasized the need for improved emergency response systems and AI-powered predictive safety measures. By addressing these gaps, our research provides data-driven insights into user needs, shaping policy recommendations and technological enhancements. The study underscores the urgent need for seamless integration between technology and law enforcement ensuring real-time intervention and public trust. This study is based on data collected through a structured survey with 265 respondents from diverse demographics across India. The survey assessed awareness, adoption and effectiveness of technology-driven safety solutions for women. These findings have significant implications for policymakers, developers and advocacy groups highlighting the need for safer, more reliable and accessible solutions. As technology evolves, a collaborative approach involving stakeholders, law enforcement and communities is essential to strengthen women's safety. This research bridges the gap by offering an evidence-based perspective on optimizing existing solutions, fostering innovation and advancing a safer, technology-driven future for women.

Keywords: Women's Safety, Technology, AI, IOT, Surveillance, Mobile Apps, Cybersecurity, Law Enforcement

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DOI

10.29121/shodhkosh.v4.i2.2023.6089

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

1. INTRODUCTION

- **Overview**

In recent years, the role of Information Technology (IT) in ensuring women's safety in India has become increasingly significant. With rising concerns about gender-based violence and the need for preventive measures, technology has emerged as a crucial tool for enhancing security, providing quick assistance and enabling better law enforcement [1]. This study aims to analyze how IT contributes to women's safety through technological interventions such as mobile applications, emergency response systems, surveillance and data-driven policy-making [2-3].

The research is based on primary data collected through a structured Google Form survey, comprising ten questions targeting diverse demographic groups. This quantitative approach will assess public awareness, usage patterns of safety technologies and the perceived effectiveness of these digital solutions in mitigating risks to women's safety. The findings

from the collected data will highlight key trends, gaps and areas for improvement in leveraging IT for women's security [4].

- **Background**

Understanding the scale and nature of crimes against women in India is crucial to developing meaningful solutions—especially tech-based ones that empower, protect and respond efficiently. The following data visualizations are based on reports from the National Crime Records Bureau (NCRB) between 2016 and 2022 [6]. They capture not only the disturbing upward trends in violence but also emphasize the growing relevance of Information and Communication Technology (ICT) in both prevention and reporting.

1) Total Crimes Against Women (2018–2022)

Below graph tracks the total number of reported crimes against women in India over five years. It reflects how social, economic and pandemic-related factors may have influenced reporting trends.

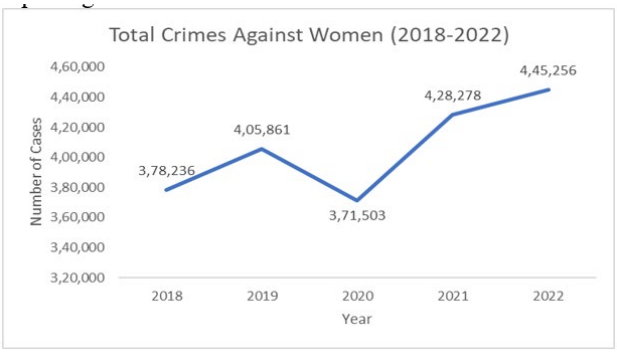

Figure 1 Line Graph depicting the Total Crimes Againts Women from 2018 to 2022

Interpretation:

The data shows a general rise from 378,236 cases in 2018 to 445,256 in 2022 with a noticeable dip in 2020 likely tied to COVID-19 lockdowns that reduced reporting rather than actual incidents. The post-pandemic surge highlights how ICT tools like emergency apps and digital reporting platforms, can play a critical role in bridging the gap when physical access to support systems is limited.

2) Crime Rate Per 100,000 Women by State (2022)

While total cases give us the big picture, crime rate per capita reveals how intense the issue is relative to population. This chart focuses on states and union territories with the highest crime rates against women in 2022.

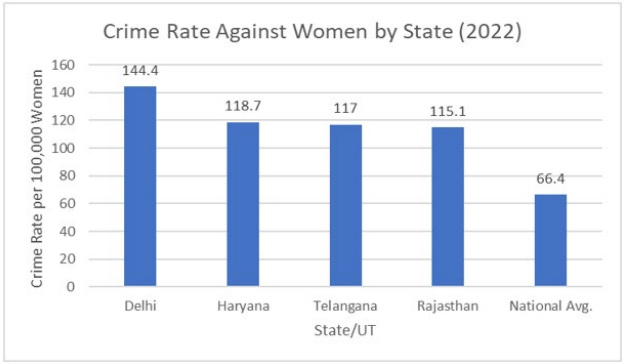

Figure 2 Bar Chart depicting the Crime Rates Againts Women State-wise of year 2022

Interpretation:

Delhi stands out starkly with a crime rate of 144.4, more than double the national average of 66.4. Other states like Haryana and Telangana follow closely behind. These disparities underscore the urgent need for region-specific ICT interventions especially in urban centers where risk is amplified but tech adoption is higher.

3) Breakdown of Crime Types (2022)

Below pie chart breaks down the various types of crimes women faced in 2022 showing the share each category holds within the total number of reported cases.

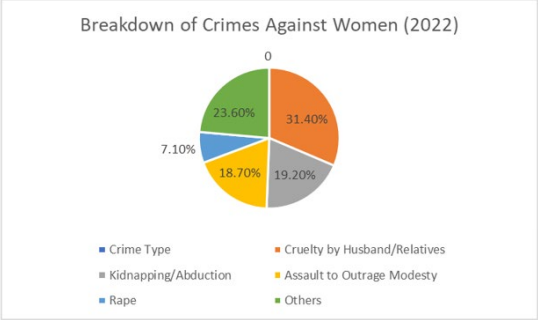

Figure 3 Visulization of different crimes happening againts women as per 2022

Interpretation:

Domestic violence categorized here as "cruelty by husband or relatives" dominates the chart at 31.4%. Kidnapping/abduction and assault are close behind, while rape accounts for just over 7%. These figures illustrate not only the widespread nature of intimate partner violence but also the importance of discreet reporting mechanisms areas where ICT solutions can offer anonymity and safety.

4) Trend of Rape Cases in India (2016–2022)

This chart offers a year-by-year account of reported rape cases over a seven-year period, showing how the numbers have fluctuated and where interventions might be working or failing.

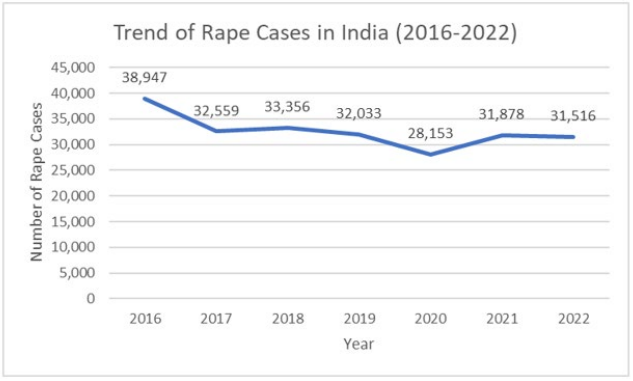

Figure 4 Different Trends of Rape Cases in India from 2016 to 2022 collected from NCRB Data

Interpretation:

The graph reveals a decline from 38,947 cases in 2016 to 31,516 in 2022 though the path isn't linear. There's a significant drop in 2020, aligning with pandemic restrictions, followed by a small rebound. The overall trend hints at possible improvements in awareness or safety but also shows persistent underreporting. Enhanced emergency response systems like panic buttons and location tracking could further push these numbers down if implemented effectively.

5) Cybercrimes Against Women (2018–2022)

With digital platforms becoming an extension of public space, cybercrimes have emerged as a serious threat to women's safety.

Interpretation:

Cases more than doubled from 1,315 in 2018 to an estimated 3,319 in 2022 a sharp 24.4% rise in just one year. The steady climb reflects both increased usage of digital spaces and improved awareness/reporting. At the same time, it underscores a paradox: while ICT enables harassment, it also offers solutions like AI moderation, blocking tools and digital helplines that must be scaled and improved.

2. LITERATURE SURVEY

Table 1 LIST OF EXISTING LITERATURE

Paper	Methodology	Gap	Findings	Problem Statement
Torrao, G., Htait, A., & Wong, S. H. S. (2024). Perceptions of Women's Safety in Transient Environments and the Potential Role of AI in Enhancing Safety: An Inclusive Mobility Study in India. *Sustainability*, *16*(19), 8631. https://doi.org/10.3390/su16198631	Mobility survey conducted. AI and machine learning explored for safety improvements.	Lack of AI-driven real-time safety solutions in women's mobility studies.	80% of women alter travel due to safety and harassment impacts mobility choices.	Women face safety risks in transit, limiting mobility and AI-based solutions could enhance security.
Vidani, Jignesh, Empowering Women in the Digital Sphere: Cyber Crime Combat Strategies in Indian Social Media (April 30, 2024). Available at SSRN: https://ssrn.com/abstract=4849744 or http://dx.doi.org/10.2139/ssrn.4849744	Analysis of cyber threats strategies for protection	Limited focus on digital literacy cybersecurity laws for women	Cyberbullying stalking identity theft rising solutions needed	Women need stronger digital safety measures and legal support
Gupta, P., Singh, K., & Sidhu, B. K. (2024). Transforming women safety with information technology: A mobile real-time intelligence framework. *Journal of Electrical Systems*. https://doi.org/10.52783/jes.1430	AI and machine learning integrated for real-time safety features using data science.	Existing systems lack predictive safety measures and real-time audio/video recording.	Current safety technologies do not fully address women's security needs. AI can enhance real-time protection.	Despite technological progress, women's safety remains a concern.
Xiao Yuan Huang, Emma West and Sai Samba Karthikeya Pinnelli. 2023. Crowdsourcing Data for Safer Travel Experiences for Women in India. In Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems (CHI EA '23). Association for Computing Machinery, New York, NY, USA, Article 581, 1–6. https://doi.org/10.1145/3544549.3583836	Diary study competitor analysis user interviews	Limited studies on gender-based safety in transit	High violence reported in public transport and streets India ranked most dangerous for women in 2018	Women face safety risks due to social norms and inadequate security measures
Sudhakar Puskar, & Kushendra Mishra. (2023). Forging Technology in women's security: Introduction Of M- Protection In India. *Journal of Management and Science*, *13*(4), 24 - 34. https://doi.org/10.26524/jms.13.40	Analysis of m-protection challenges and usage patterns	Low adoption of m-protection in India reasons unclear	Limited awareness and accessibility affect usage improvement needed for full adoption	Women face safety risks due to gaps in m-protection awareness and usage
Jasmeet Kaur, Meghna Gupta and Pushpendra Singh. 2022. Understanding the Role of Technology-mediated Solutions for Women's Safety in Urban India. In Proceedings of the 5th ACM SIGCAS/SIGCHI Conference on Computing and Sustainable Societies (COMPASS '22). Association for Computing Machinery, New York, NY, USA, 638–642. https://doi.org/10.1145/3530190.3534843	Interviews with urban women in India on safety technology	Limited research on women's views and needs in safety technology	Women seek precautionary reactionary healing support current tech lacks user perspective	Safety technology must align with women's needs beyond victim-centric design
Singh, R., & Singh, A. (2024). Safe environment for working women - A critical analysis. *International Journal of Fundamental and Multidisciplinary Research, 6*(3).	Analysis of workplace harassment legal review	Gaps in Sexual Harassment Act 2013 justice remains limited	Women face multiple workplace harassment forms legal protection needs strengthening	Safe work environments require stronger laws and enforcement

https://doi.org/10.36948/ijfmr.2024.v06i03.19807				
Varghese, V., Kumar, A. S., Padmanaban, V., Jaffer, M., & others. (2024). A comprehensive women's safety platform offering secure login, emergency panic, news alerts, route navigation with police station proximity, incident reporting. *International Journal of Innovative Research in Engineering.* https://doi.org/10.59256/ijire.20240502011	GPS tracking disaster hotlines for emergency response	Safety tech needs higher accuracy less user input	Rising crimes require advanced automatic warning systems	Women's safety needs better tech-driven emergency solutions
Sree, M., Shri, A. G., Jha, A. K., & Kishor, K. (2024, November). Women safety analytics - Protecting women from safety threats. *Proceedings of the International Conference on Recent Trends in Computing & Communication Technologies (ICRCCT'2K24).* https://doi.org/10.59544/GBCG5686/ICRCCT24P34	Machine learning threat filter wearable safety device	Lack of real-time monitoring and threat detection technology	Harassment cases rising advanced safety measures needed	Women require strong tech solutions for protection
Naushin, K., & Tanzila, K. (2024). Case study: Role of technology in protecting women against harassment. *International Journal for Research in Applied Science and Engineering Technology (IJRASET).* https://doi.org/10.22214/ijraset.2024.57965	Mobile apps wearable devices for distress signals	Accessibility digital literacy privacy issues need focus	Technology improves safety but access and inclusivity remain challenges	Women need equitable access to safety technology

3. METHODOLOGY

This study employs a quantitative research approach based on a structured online survey to analyze the role of Information Technology (IT) in enhancing women's safety in India. The primary data collected is used to identify patterns of public perception, technology usage and effectiveness of IT-enabled safety solutions.

1) Survey Design Overview

Table 2 USER SURVEY DESCRIPTION

Element	Description
Research Type	Quantitative
Data Source	Primary data collected via online Google Forms
Survey Format	Structured questionnaire with closed-ended questions
Duration of Data Collection	1 weeks (March 2025)
Sample Size	265 respondents
Sampling Technique	Voluntary response sampling with diverse outreach (social media, email, etc.)
Target Group	General public aged 16+ across urban and rural areas in India
Data Visualization	Pie Chart
Ethical Considerations	Anonymous responses; no personal identifiers collected

2) Key Variables Analyzed

Table 3 KEY VARIABLES ANALYZED IN THE SURVEY

Variable Group	Example Variables	Purpose
Demographic	Age, Gender, Location	Understand diversity and representation
Access to IT Tools	Smartphone use, App installations	Measure reach and adoption of technology
Perception	Feeling of safety, trust in apps, emergency response quality	Assess effectiveness and user trust
Behavioral Usage	Frequency of safety app usage, sharing of tools	Gauge integration into daily routines
Tech Effectiveness	Perceived usefulness, responsiveness, reliability	Evaluate outcome satisfaction

3) Scope and Limitations

Table 4 SCOPE AND LIMITATIONS OF THE SURVEY

Strengths	Limitations
Diverse demographic coverage	Uneven regional representation
Use of real-time public opinion data	Self-reported data may include biases
Integration of tech-enabled tools in safety analysis	No longitudinal tracking (single-time survey only)
Data Visualization allows nuanced interpretation	Limited by sample size and voluntary participation bias

4) Ethical Compliance and Consent Summary

Table 5 SUMMARY OF ETHICAL COMPLIANCE FOLLOWED

Ethical Consideration	Implementation Details
Informed Consent	Survey included an introductory section explaining purpose and anonymity
Voluntary Participation	Respondents were free to skip or exit at any point
Anonymity	No names, contact information or identifiers collected
Data Storage	Stored securely in encrypted Google Drive and local system
Use of Data	Responses used solely for academic research with no third-party sharing

5) Data Validation and Quality Assurance

Table 6 VALIDATION OF USER DATA AND QA

Validation Step	Description	Tool/Technique Used
Duplicate Check	Ensured no repeated responses	Google Forms / Excel
Incomplete Response Filter	Removed submissions with >30% unanswered questions	Manual filtering in Excel
Response Time Analysis	Flagged submissions completed in <1 minute for quality check	Google Forms Timestamps

4. RESULTS AND KEY FINDINGS

1) User Survey

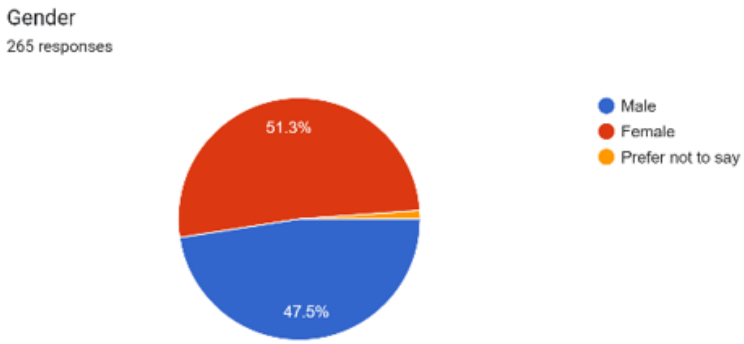

Figure 6: Gender Analysis

The gender distribution of the survey respondents indicates a well-balanced participation with 51.3% identifying as female, 47.5% as male and 1.1% preferring not to disclose their gender. This diverse representation ensures that the findings reflect a broad range of perspectives particularly highlighting the views of women, who are most directly affected by safety issues. The nearly equal male-female ratio also allows for comparative insights into gender-based perceptions and experiences related to safety and the use of technology in addressing such concerns.

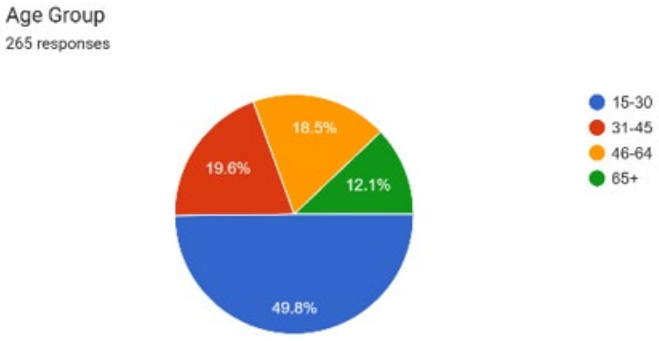

Figure 7 Age Group Analysis

The age-wise distribution of the survey reveals that the majority of respondents (49.8%) fall within the 15–30 age group, indicating strong participation from younger individuals who are typically more tech-savvy and actively engaged with digital tools. Respondents aged 31–45 (19.6%) and 46–64 (18.5%) also contribute significantly, offering valuable insights from working professionals and middle-aged users. Meanwhile, 12.1% of participants are aged 65 and above reflecting input from older adults who may have different safety concerns and levels of digital literacy. This diverse age range enhances the depth of the analysis by incorporating generational perspectives on technology and women's safety.

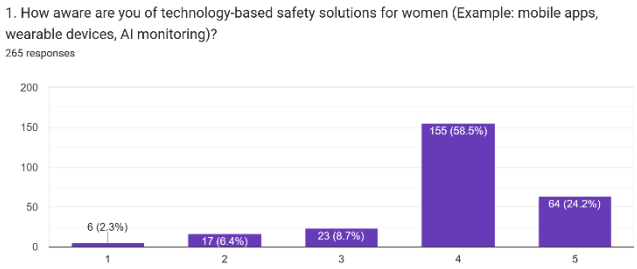

Figure 8 Awareness of Tech-Based Safety Solutions for Women

Data from the survey reveals that a majority of respondents rated their awareness of technology-based safety solutions between 3 to 5 indicating moderate to high familiarity with tools like mobile apps, AI monitoring and wearable safety devices. This suggests that over 60% of participants are at least somewhat aware of digital safety interventions for women. However, a notable portion of respondents at levels 1 and 2 points to an awareness gap that must be addressed through targeted digital literacy initiatives. The findings emphasize the need for inclusive outreach strategies to ensure these tools are known and accessible across all sections of society.

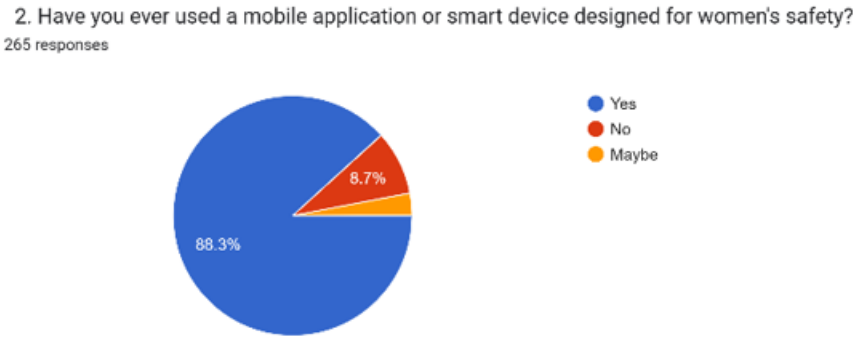

Figure 9 Usage of Safety-Focused Mobile Applications or Devices

Out of 265 respondents only 8.7% reported having used a mobile application or smart device specifically designed for women's safety while 88.3% said they had not. An additional 3% responded with "maybe" indicating uncertainty or limited engagement. This data highlights a significant gap between awareness and actual usage, pointing to potential barriers such as lack of accessibility, trust or perceived effectiveness of these tools.

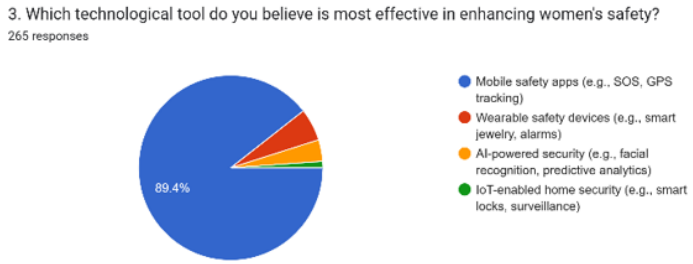

Figure 10 Perceived Effectiveness of Technological Tools for Women's Safety

Among the 265 respondents, mobile safety apps emerged as the most trusted solution with 89.4% selecting them as the most effective tool for enhancing women's safety. Wearable devices followed distantly at 5.7% while AI-powered security systems (3.8%) and IoT-enabled home security (1.1%) received minimal preference. The data suggests that mobile apps are widely recognized for their accessibility and practicality making them the primary choice among users.

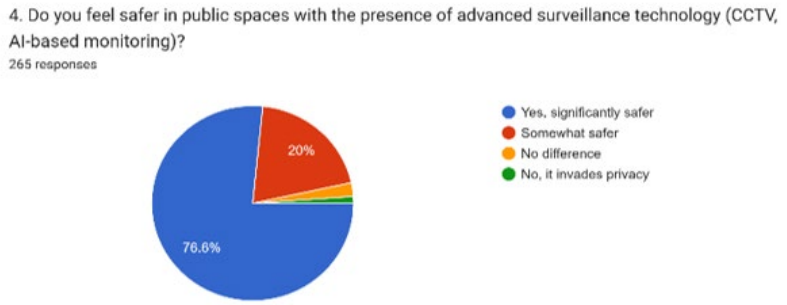

Figure 11 Impact of Surveillance Technology on Perceived Safety in Public Spaces

The majority of respondents (76.6%) reported feeling significantly safer in public spaces with the presence of advanced surveillance tools like CCTV and AI-based monitoring. An additional 20% felt somewhat safer while 2.3% observed no change and 1.1% expressed concerns about privacy. These responses reflect a strong public endorsement of surveillance technology as a deterrent to crime and a support system for public safety despite minor concerns around personal privacy.

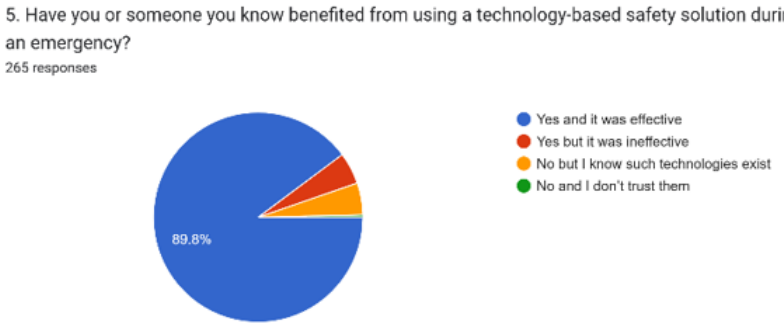

Figure 12 Firsthand Experience with Tech-Based Safety Solutions

Of the 265 participants 89.8% stated they or someone they know had benefited from a technology-based safety solution during an emergency. Meanwhile, 4.9% had a less effective experience and another 4.9% acknowledged the

existence of such tools without using them. Only 0.4% expressed distrust. The high rate of reported positive outcomes underscores the practical value and reliability of digital safety tools in real-life situations.

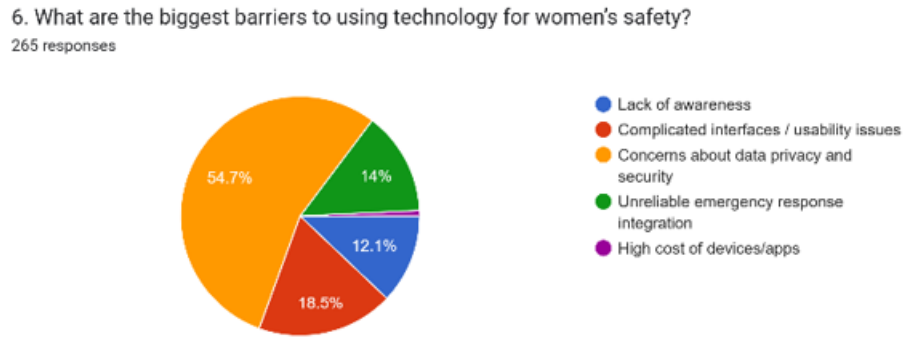

Figure 13 Primary Barriers to Adopting Safety Technologies

The most cited barrier among respondents was concern over data privacy and security, selected by 54.7%. Usability challenges followed at 18.5% and unreliable emergency response integration accounted for 14%. Lack of awareness was a concern for 12.1% while cost was the least significant factor at just 0.8%. These insights indicate that while affordability is not a major obstacle, trust in data handling and user-friendly design are critical to wider adoption.

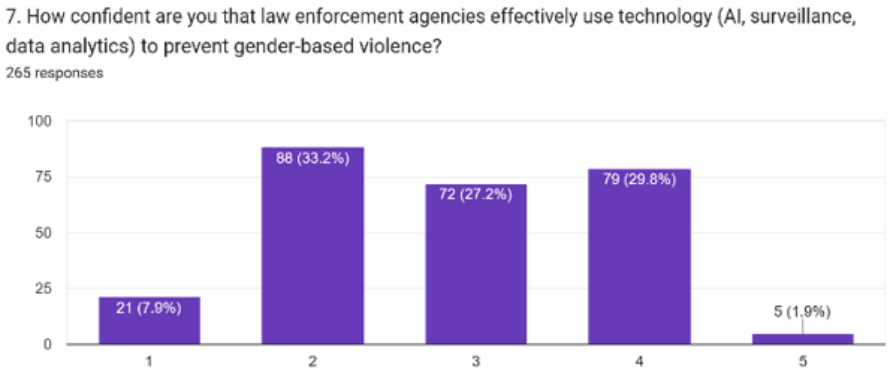

Figure 14 Public Confidence in Law Enforcement's Use of Technology

Confidence in law enforcement's use of technology to prevent gender-based violence was mixed. The largest share of respondents (33.2%) rated their confidence at level 2 (low), followed by 29.8% at level 4 and 27.2% at level 3. Only 7.9% selected the lowest confidence level (1) and 1.9% chose the highest level (5). These responses suggest a moderate level of skepticism highlighting the need for improved transparency and effectiveness in tech-driven policing strategies.

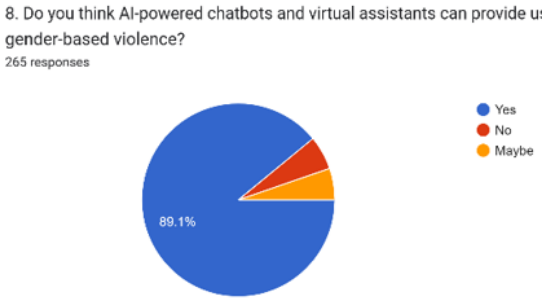

Figure 15 Perceived Usefulness of AI Chatbots for GBV Support

A substantial 89.1% of respondents believe AI-powered chatbots and virtual assistants can offer valuable support to victims of gender-based violence. In contrast, 5.7% disagreed and 5.3% were uncertain. The results reflect broad confidence in AI as a supplementary tool for delivering timely information and assistance in sensitive situations.

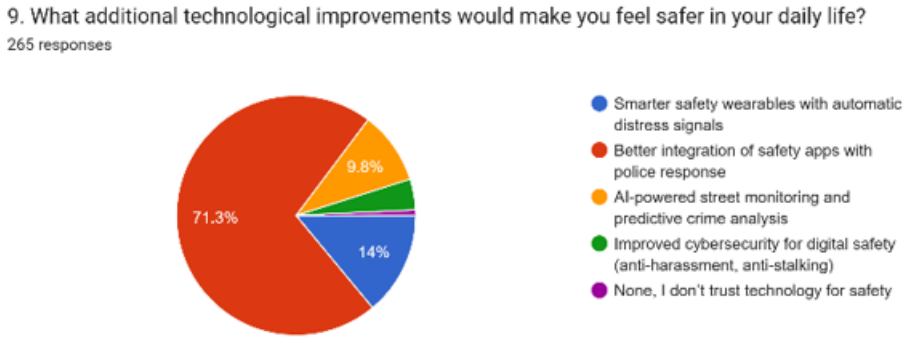

Figure 16 Priority for Enhanced Police Integration

The majority of participants (71.3%) identified better integration of safety apps with police response as the most impactful technological improvement for increasing personal safety. Other suggestions included smarter wearables with automatic distress signals (14%) and AI-powered monitoring and predictive crime analysis (9.8%). A smaller portion emphasized the need for improved cybersecurity (4.2%) while 0.8% expressed a lack of trust in technology-based safety measures. These insights point to a strong public demand for more responsive and connected emergency systems.

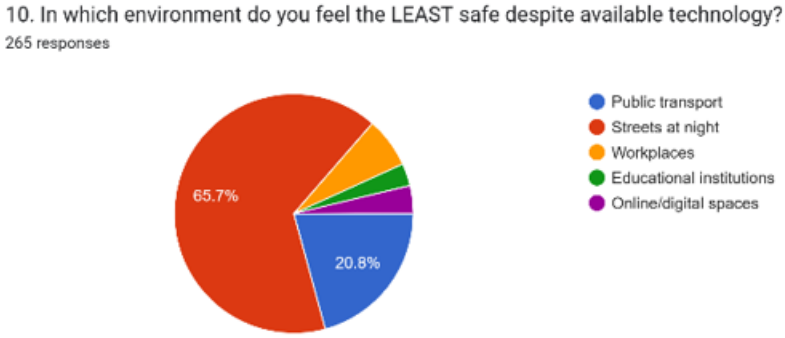

Figure 17 Streets at Night Remain Major Concern

A significant 65.7% of respondents reported feeling the least safe on streets at night even with available technology. Public transport followed at 20.8%, while environments like workplaces (6.8%), digital spaces (3.8%) and educational institutions (3%) were seen as comparatively safer. This indicates a continued perception that current safety technologies have limited impact in outdoor, unregulated environments.

5. DISCUSSION

1) Role of Emerging Technologies in Addressing Gender-Based Violence

The integration of Artificial Intelligence (AI) and the Internet of Things (IoT) into safety interventions for women is reshaping how societies respond to gender-based violence (GBV). AI-driven tools particularly chatbots and virtual assistants, offer survivors access to continuous, confidential support. These tools can assist users in navigating complex systems related to reporting, seeking legal aid, or accessing psychological and medical help. For instance, AI-powered chatbots have been developed to simulate supportive conversations while simultaneously directing users to nearby services and resources (UN Women, 2023).

Wearable IoT devices have added a new dimension to personal safety. Devices such as smart jewelry and connected wristbands can detect sudden movement or voice cues, triggering emergency alerts to pre-set contacts or authorities. A

notable example includes the use of smart rings embedded with GPS and emergency triggers, now deployed in several women-focused pilot programs across urban India (Yodda, 2024).

Moreover, the combination of AI and IoT facilitates real-time data collection and pattern recognition. These insights enable policymakers and local law enforcement to identify violence-prone zones or emerging trends in GBV cases. Aggregated, anonymized data allows for evidence-based planning and targeted interventions (Protex AI, 2024).

2) Digital Safety Tools and Their Influence on Public Confidence

Information and communication technologies (ICTs) play a key role in strengthening public trust in women's safety measures. Access to digital tools not only enhances safety but also promotes agency. Women, especially in urban areas, increasingly rely on mobile safety applications, personal defense alarms and malware-protection software to ensure both physical and digital security (Indian Express, 2024).

One such tool is the SheCan Tool which allows users to rate public places based on safety and report incidents of harassment anonymously. These ratings can guide both individual behavior and municipal policy. Similarly, personal defense gadgets like Birdie, a widely used alarm device, have seen broad adoption among women aged 18–35 (She's Birdie, 2024).

Despite these advancements, disparities in access remain a concern. Urban women are more likely to be digitally literate and equipped with safety apps, whereas rural counterparts often lack the infrastructure and training required to fully utilize such tools (GSDRC, 2023).

3) Technology-Facilitated Harassment and the Need for Safer Digital Spaces

With the rise of online harassment, ensuring safety in virtual spaces is just as critical as physical protection. According to reports by UN Women and Tech Policy Press (2023), platforms like Meta and X (formerly Twitter) are implementing AI moderation and community safety tools, yet their efficacy varies widely. Women often face disproportionate rates of online abuse, leading to digital disengagement and reduced participation in online discourse.

Efforts to create safer digital environments must therefore include stronger content moderation, clear reporting mechanisms and transparency in algorithmic decision-making. Long-term solutions involve not only reactive moderation but proactive design that incorporates safety features from the ground up (Tech Policy Press, 2023).

4) Collaborative Frameworks Driving Safety Innovation

Intersectoral collaboration is a key driver in the development of scalable and context-specific safety solutions. Partnerships between government bodies and private technology firms have led to the deployment of emergency response systems that interface directly with law enforcement. The Digital Transformation in Industrial Safety initiative, for example, demonstrates how industrial IoT applications can be repurposed for public safety infrastructure (EHS Insight, 2024).

Non-governmental organizations have also partnered with the tech sector to create community-based applications that focus on localized safety challenges. All Tech Is Human through its Trust & Safety initiative, engages a diverse set of stakeholders including technologists, policy experts and social scientists to co-design inclusive solutions (All Tech Is Human, 2024).

On a global scale, organizations like the Global Initiative for Industrial Safety (GIFIS) and IDEC USA are promoting connected safety systems that combine surveillance, predictive analytics and real-time alerts. While originally developed for industrial environments, these frameworks offer scalable models adaptable to public and semi-public spaces where women are vulnerable (GIFIS, 2024).

5) Public Perception and Digital Safety Tool Usage Patterns

Recent studies indicate that perceptions of safety vary across environments. According to the She Shakti Suraksha Survey 2025, a large majority of women (87%) consider POSH (Prevention of Sexual Harassment) frameworks in workplaces effective with 92% feeling safe in these settings (CNBC TV18, 2025). Similarly, educational institutions report high levels of perceived safety with only 2% of female respondents expressing concern (Firstpost, 2025).

However, public spaces present a different picture. A global survey by WIN MR (2024) shows that nearly half (46%) of women do not feel safe walking alone at night, suggesting that current public safety measures technological or otherwise are insufficient in open environments.

Table 7 Common Barriers to Using Safety Technologies

Barrier	Affected Group
Low digital literacy	Rural women
Poor connectivity	Remote regions
App usability issues	Older users
Privacy concerns	All demographics
Lack of trust	First-time users

Another important consideration is the gap between the availability and consistent use of safety apps. Many users download safety apps but fail to use them regularly, citing usability issues or low perceived effectiveness. This highlights the importance of user-centered design and regular updates based on feedback (FRA, 2023). Frequent technical glitches, lack of multilingual support, and battery drainage are also cited as reasons for abandonment. Additionally, users often report that safety apps feel reactive rather than preventative, reducing their sense of immediate utility. To address these concerns, developers must engage directly with diverse user groups during the design and testing phases. Incorporating offline functionality and integrating with local emergency services could further boost trust and long-term engagement.

Table 8 AI and IoT-Based Technological Interventions in Women's Safety

Technology Type	Description	Examples	Functionality	Deployment Area
AI Chatbots	Conversational agents for assistance	MySafetynet, SARA by Safecity	Reporting, emotional support, legal help	Urban, Semi-Urban
Wearable IoT Devices	Personal safety wearables	Smart jewelry, GPS bracelets	SOS alerts, GPS tracking, motion sensors	Urban, Public Spaces
Home IoT Surveillance	Smart home security systems	Google Nest, Ring	Activity detection, emergency alerts	Residential settings
Predictive Analytics	Crime pattern detection using data	Protex AI, Police Smart Surveillance (India)	Heatmap generation, hotspot identification	City-level Planning
Digital Safety Apps	Mobile-based safety applications	Raksha, Himmat, Women Safety (UP Police)	Panic button, location tracking	Pan-India

Digital literacy also plays a crucial role. Women in lower-income or rural regions often lack the necessary digital skills to use these technologies effectively, creating a digital divide that must be addressed through education and outreach (ISC2, 2025).

Table 9 Multi-Stakeholder Collaborations for Women's Safety Technologies

Collaboration Type	Key Stakeholders Involved	Initiative Name / Example	Area of Focus	Outcomes / Benefits
Government-Industry	Ministry of Electronics + Google	Digital Safety Drive	Public awareness, tool access	Increased reach of safety apps
NGO-Tech Alliance	Safecity + Red Dot Foundation + IBM	AI for Gender Safety	AI reporting tools	Community-based data insights
Academia-Industry	IITs + Private Firms	Predictive Surveillance Research	Campus safety systems	Research-based safety models
Global Coalition	UN Women + Meta + Microsoft	Online Safety Pledge	Digital safety & content filtering	Strengthened online moderation
Municipal Partnerships	Smart Cities Mission + IoT startups	Smart Poles and CCTV Integration (Delhi)	Infrastructure-based surveillance	Reduced public harassment reports

Table 10 Sector-Wise Tech-Based Interventions for Women's Safety

Sector	Common Intervention
Education	Campus monitoring apps
Corporate	POSH training via e-modules
Transport	GPS-enabled buses

Public Housing	CCTV and smart lighting

6. PRACTICAL IMPLICATION

- Safety technologies must be designed with a user-centric approach, ensuring ease of use, language accessibility and low technical barriers.
- Consistent collaboration between tech developers, law enforcement and policymakers can improve real-time response and trust in digital tools.
- Rural deployment requires parallel investment in digital literacy programs and network infrastructure to ensure equitable access.
- Feedback-driven updates and regular testing with diverse user groups can improve app reliability and sustained engagement.
- Awareness campaigns and community outreach are crucial for increasing adoption and educating women on available digital safety solutions.

7. LIMITATIONS

- The study relies heavily on secondary data sources, which may not fully reflect real-time user behavior or regional variations.
- Limited availability of disaggregated data specific to rural women's safety tech adoption may affect the generalizability of findings.
- Survey data referenced is mostly national or urban-focused, potentially underrepresenting marginalized groups.
- The rapidly evolving nature of technology may render some tools or statistics outdated shortly after publication.
- Cultural and social factors influencing technology usage were not explored in depth and require further qualitative research.

8. CONCLUSION AND FUTURE SCOPE

This study highlights the significant role that Information Technology plays in enhancing women's safety in India. The integration of AI, IoT and other advanced technologies has led to the development of innovative solutions that provide real-time assistance, effective surveillance and data-driven policy-making aimed at reducing gender-based violence. Public perception data reveals a positive trend in safety perceptions in structured environments like workplaces and educational institutions suggesting that technological interventions, when properly implemented alongside policy measures, can significantly improve women's sense of security. However, the persistent concerns about safety in public spaces indicate that more targeted technological solutions are needed in these areas. The collaborative efforts between government agencies, technology companies, NGOs and academic institutions are creating more comprehensive safety ecosystems. These partnerships are essential for developing solutions that address the multifaceted nature of women's safety concerns and ensure that technologies are accessible across diverse demographic groups.

- For technology to maximize its impact on women's safety, several factors must be addressed:
- Improving digital literacy and access across all demographic groups
- Ensuring user-friendly design that encourages consistent usage
- Developing context-specific solutions for different environments (workplace, educational, public spaces)
- Strengthening the integration between technological solutions and law enforcement response
- Incorporating women's perspectives in the design and implementation of safety technologies

Continuous improvement and sustained collaborative efforts between the government, private sector and civil society are essential to create comprehensive, tech-driven safety ecosystems that ensure a safer and more inclusive

society for women in India. As technology continues to evolve, its potential to transform women's safety will only increase making ongoing research and development in this area crucial for creating lasting positive change.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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