

Digital Literacy as a Gateway to Safety: Examining ICT-Based Women's Helplines as Digital Education Platforms in Rajasthan and Uttar Pradesh, India

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ABSTRACT

The issue of violence toward women is still an important concern as it relates to both the public health sector and government. Many barriers limit women's access to traditional justice or redress systems, many of which are related to technology. These include physical isolation, social stigma, lack of trust in institutions, and digital disconnection. The focus of this paper will be to analyse two state-level technology-based helplines for women: Women Helpline 181 (WHL 181) in the State of Rajasthan and Women Power Line 1090 (WPL 1090) in the State of Uttar Pradesh. While both helplines provide an emergency response mechanism for women who have been subjected to domestic violence, the authors argue that they also act as educational mechanisms for teaching women about digital technologies and how they can use them as tools for civic engagement. An examination of secondary data from sources including National Crime Records Bureau (NCRB) reports of crime in India from 2018 through 2022, National Family Health Survey -5 (NFHS-5) 2019-21 report, Telecommunications Regulatory Authority (TRAI) performance indicator reports, and Ministry of Women and Child Development (MoWCD) publication reports utilised a descriptive comparative methodology. The analysis included statistical methodologies used to determine the relationship between variables, including Pearson correlation, linear regression, Compound Annual Growth Rate (CAGR), Mann-Whitney U-test, Chi-Square test, and Spearman Rank Correlation. The results show that the WPL 1090 has a higher success rate in resolving complaints than WHL 181 (98.86% vs 92.27%; $p=.0079$). However, WHL 181 has experienced a much faster growth rate (CAGR) than WPL 1090 (8.94% vs 4.19%). Additionally, there was a perfect positive correlation between the level of digital literacy and use of the helpline ($\rho=1.000$, $p<.001$), indicating that digital literacy is one of the best predictors of use of internet-based services to increase safety. As stated above, both states had rates of digital awareness that were well below those reported nationally. Based on the Technology Acceptance Model and the theory of digital inclusion, the research provides new empirical evidence supporting the idea that women's helplines should be conceptualized as digital education platforms. The findings present strong arguments for programs like Digital India and Mission Shakti to include specific components of structured digital literacy education within their respective programs to support equal opportunity access by women at greatest risk.

Keywords: Digital literacy, Gender digital divide, ICT governance, Rajasthan, Uttar Pradesh, Women's helpline

INTRODUCTION

Violence against women is one of the most widespread human rights violations globally, with the United Nations estimating that one in three women around the world experiences physical or sexual violence during her lifetime (UN Women, 2021). In India, this challenge is compounded by specific structural barriers to accessing formal approaches to redressal barriers that arise from social stigma, remoteness from centers of administration and justice, institutional distrust, and, in an increasing number of the country's most remote regions, a kind of digital exclusion which restricts their access to technology-mediated governance systems.

This combination of challenges has resulted in a new category of interventions being created by the State and NGOs alike- ICT-based women's helplines that are at once emergency response systems but also serve as platforms to build women's confidence with digital technologies as well as their civic agency - Womanity is a case in point.

India's national data on crime highlights the importance of this challenge in stark terms. The report released in 2022 by the National Crime Records Bureau recorded a total of 4,45,256 cases of crime against women, a rise of nearly 15.3 on the 2018 baseline of 3,71,503 (NCRB, 2022). Uttar Pradesh and Rajasthan together accounted for

nearly a quarter of total national cases in 2022, with UP registering 65,743 cases (crime rate: 58.6 per lakh women) and Rajasthan registering 45,058 cases and a crime rate of 115.1 per lakh women, the highest crime rate per lakh women population among major States (NCRB, 2022). Yet such official records grossly underestimate the scale of violence; National Family Health Survey-5 found that just 14.0% of Rajasthan women and a mere 12.0% of UP women subjected to spousal violence sought help from formal sources including the police (IIPS & MoHFW, 2021).

The discrepancy between violence experienced and formal help-seeking is both a social norm, and one of digital exclusion where “GSMA’s Mobile Gender Gap Report (2023), reports that 40% (or, 13 million) less Indian women use mobile internet than men, while IAMA-Kantar Internet in India Report (2023), records, that Women constitute only 31% of all active internet users in India. TRAI’s yearly Performance Indicators report for 2022-23 confirms that, while India crossed a milestone of 1.17 billion total telephone subscribers in March 2023, with 881 million internet subscribers, in the year, the rural women at maximum safety risk are still out of the digital ecosystem” (TRAI, 2023). Given this context, two state-level ICT platforms are worth our attention as significant interventions. Recent studies have shown that this gap has not been closing at all; in fact it will likely take many years for women and girls to reach parity when it comes to using the Internet globally according to the ITU’s Global Connectivity Report (ITU, 2023). The GSMA also reported on India’s mobile gender gap, finding that there are significant gaps in terms of mobile ownership and mobile Internet use among Indian women compared to their male counterparts (GSMA, 2024). Additionally, Sonne Vyas (2024) indicates that an Indian woman’s ability to obtain and use her mobile telephone is influenced by multiple factors including her own self-confidence, whether or not she receives permission from her family members and what her community expects of her. Furthermore, Potnis (2016) and Joshi et al. (2020) demonstrate that although women in India face a number of barriers related to accessing mobile telephones and mobile Internet -- including financial constraints and limited education -- these same barriers make the potential benefits associated with mobile phones unavailable to women who live in poverty or in slums. Overall, the studies referenced above clearly show that the digital divide between boys and girls identified in this study is a long-term issue and one that occurs across multiple levels; therefore, it is imperative that digital literacy be integrated into ongoing programs and services that provide women with the skills they need to compete in today’s job market, including WHL 181 and WPL 1090.

The Uttar Pradesh Women Power Line 1090 (WPL 1090) was set up in 2012 and is run through the UP Police Department. It has a multi-channel complaint registration and resolution process that maintains a 98.86% average resolution rate over the period 2018-2022. Another helpline system is Women Help Line 181 (WHL 181), in Rajasthan, administered under its Mission Shakti in integration with the state’s One Stop Centre network, which records a Compound Annual Growth Rate of 8.94% in the number of helpline registrations during the period 2018-22, which is the highest among State Helplines across India. Both platforms, if we step beyond initial sacrificial rites to honour the police and lawyers, are in fact gateways through which women can experience, engage with, and gain confidence in configurations of digital institutions.

This paper further argues that characterizing WHL 181 and WPL 1090 as simply law enforcement tools actually misunderstands their most important contribution to social infrastructure: they are digital education onboarding sites. Drawing from the Technology Acceptance Model (Davis, 1989; Venkatesh et al, 2003) and Digital Inclusion Theory (Warschauer, 2003; van Dijk, 2020), we conduct a statistically validated comparative analysis of WHL181 and WPL1090, grounded in analyses of secondary data from NCRB, NFHS-5, TRAI and MoWCD, adding to the empirical understanding of digital education for all. The paper is structured as follows. In section 2, we present the literature review. In section 3, we provide background on both helplines. In section 4, we describe our research methodology. In section 5, we present our analysis and findings. In section 6, we discuss our results. In section 7, we offer conclusions and policy implications.

Novelty of the Study

While a significant number of studies have investigated digital exclusion (van Deursen & van Dijk, 2011; Hargittai, 2002; Scheerder et al., 2017) and the impact of telephone and ICT based support services for women (Kalafat et al., 2007; Bennett et al., 2004; Rex et al., 2022; El Morr & Layal, 2020), there has been little connection between the two areas of research. As far as the authors are aware, none of the previous studies that were reviewed have employed statistical tests to measure the predictive ability of digital literacy in relation to helpline usage. Similarly, none of the previous studies have used inferential statistics to compare two state level ICT-based women’s helplines in India.

This study is thus unique in three ways: (i) it is the first study to empirically reconceptualize WHL 181 and WPL 1090 as digital education platforms, as opposed to simply as law enforcement and/or welfare agencies; (ii) it is the first study to employ a five test statistical analysis tool (Pearson correlation, Linear Regression / CAGR, Mann Whitney U, Chi Square and Spearman Rank Correlation) on state level helpline and digital literacy data in India; and (iii) it is the first comparative and cross state analysis of WHL 181 and WPL 1090 to be published in a Scopus

indexed journal, expanding upon the limited scope of the descriptive literature provided by Rex et al. (2022) and Gogoi et al. (2025)

Aim and Significance of the Research

The objective of this research is to determine if ICT-based women's helplines in Rajasthan and Uttar Pradesh are functioning as digital educational platforms and assess the association between digital literacy and helpline utilization through five years (2018-2022) of secondary data obtained from NCRB, NFHS-5, TRAI and MoWCD. This study will be important for four reasons. Firstly, it will extend theoretical work on the Technology Acceptance Model (TAM) (Venkatesh & Davis, 2000; Davis, 1989) and Digital Inclusion Theory (Warschauer, 2003; Van Dijk, 2020) into an understudied area - women's safety governance - and provide a response to Sen's (1999) call for treating people's access to information and institutions as a fundamental aspect of their substantive freedom. Secondly, it will demonstrate how inferential statistics may be used to analyze administrative data and survey data that are collected on a regular basis to produce relevant evidence for public policy development, thereby responding to a limitation found within comparable e-government adoption research (Dash, 2024). Thirdly, the results of this study will provide specific recommendations that are capable of being tested by Mission Shakti, the Digital India Program, and the UP Police Department on embedding specific digital literacy components into existing helpline outreach structures that draw upon the proven success of programs like the digital literacy program studied by Gogoi et al. (2025). Finally, this study will contribute India-specific empirical evidence toward United Nations' Sustainable Development Goals (SDG) - SDG 5 Gender Equality, and SDG 16 Peace, Justice and Strong Institutions - while also providing a framework for future research on South Asia help-seeking practices similar to Sultana et al. (2022).

2. LITERATURE REVIEW

2.1 Technology Acceptance and Digital Governance

The Technology Acceptance Model was first conceptualized by Davis (1989) and refined through validation studies involving 152 users across four application programs, establishing perceived usefulness and perceived ease of use as the primary determinants of user acceptance of information technology (Davis, 1989, p. 320). This model has subsequently been elaborated and synthesized by Venkatesh, Morris, Davis and Davis (2003) into the Unified Theory of Acceptance and Use of Technology (UTAUT) which identified performance expectancy, effort expectancy, social influence and facilitating conditions as four key determinants of behavioral intention to use technology, which explained 69-70% of use intention variance (Venkatesh et al., 2003, p. 425). Applied to women's helplines, the models allow consideration of why women with higher levels of digital literacy are more likely to find ICT-based safety platforms useful and accessible - and hence to use them. The Venkatesh & Davis (2000) model has been expanded upon through their creation of TAM2, which included social influence processes (image, subjective norm) and cognitive instrumental processes (output quality, job relevance) as antecedent constructs for perceived usefulness, providing an explanation of approximately 60% of variance in usage intention based on data from four longitudinal field studies. Additionally, research conducted by Compeau & Higgins (1995), demonstrated that computer self-efficacy; an individual's belief about one's own capability to utilize technology effectively, independently predicts how often individuals will use technology. This concept provides a direct link to understanding why women who have experienced some level of digital exposure tend to interact with ICT-based help lines at higher rates than men, when formal digital-literacy training does not exist.

The governance element of ICT adoption is addressed in Heeks (2002), whose work argues that digital public services in developing countries should seek to reduce the transaction costs of citizen-state interaction to be successful. In terms of women's safety, the implication here is clear; both WHL 181 and WPL 1090 reduce the social, logistical and institutional costs of reporting violence by substituting the requirement for an in-person police station visit with a telephone / multi-channel digital interface. However, as Heeks (2002) discusses, the gap between the design ideal of technology-based services and the environments in which they are used often 'opens up' their intended reach - a gap not least wider still in contexts of low digital literacy. Digital Inclusion and Gender Digital Divide in India

2.2 Digital Inclusion and the Gender Digital Divide in India

Digital Inclusion Theory emerged from Warschauer's (2003) influential book *Technology and Social Inclusion*, which argued that meaningful access to technology requires cognitive abilities, social resources and institutional support in addition to physical connectivity. Warschauer identified four dimensions of inclusion - physical, digital, human and social resources- each of which must be adequately present for the technology to serve as a tool of empowerment rather than exclusion. Van Dijk (2020) extended this framework in *The Digital Divide* to identify four sequential access barriers—motivational, physical, skills and usage access—that operate cumulatively to exclude already marginalized populations. India's gender digital divide is one of the most studied examples of these failures of inclusion. GSMA (2023) recorded a 40% mobile internet gender gap in India in 2022, while

IAMAI-Kantar (2023) found that women were only 31% of the country's active internet users in 2023. One can get the state-level picture of this divide with clarity from NFHS-5 data (IIPS & MoHFW, 2021): Only 22.4% of Rajasthan women and 16.8% of UP women used the internet in the last 12 months before the survey, compared to an all-India average of 31.9%. Mobile phone ownership was only 45.2% in Rajasthan and 38.6% in UP, well below the national average of 53.7%. Kabeer's (1999) capabilities framework, which defines empowerment as the expansion of women's ability to make strategic life choices, indicates that this digital exclusion restricts women's capability to access safety, legal and institutional resources — thus framing digital literacy not as a technological nicety but as a fundamental dimension of women's empowerment. These findings support research on second- and third-generation digital divides. While Hargittai's (2002), Scheerder et al. (2017) & Van Deursen and van Dijk's (2011) studies provide evidence for the skills gap as a major source of digital inequality, Castell's (2000) work has shown this transition to be part of a larger trend toward a globalized information society with unequal access to networks. Similarly, the World Bank's report "Digital Dividends" states that while digital technologies have the potential to increase economic growth, create new opportunities and improve services where there are sufficient 'analog complements' in terms of education, institutional capacity and regulatory frameworks in place; in their absence, benefits will largely remain in the hands of those who are already privileged.

2.3 Digital Literacy in ICT Based Women's Safety Platforms: An Analysis of Women's Help Lines in India

Over the last decade, there have been innovative governance practices that utilize Information Communication Technology (ICT) to promote women's safety and institutional service delivery in India; however, they have received relatively little attention from peer-reviewed scholarly literature in relation to their policy significance. The evidence base for using ICT-based service delivery to women in India is largely rooted in the ICT4D tradition. In a significant longitudinal study on women in rural India published in MIS Quarterly, Venkatesh, Sykes and Zhang (2020) provided evidence that ICT-based initiative usage resulted in improved health outcomes for women particularly improved rates of seeking modern healthcare but also indicated that this usage was dependent upon women's social network structures and their pre-existing digital engagement experience. Specifically, the authors identified that women who were located at the centre of weak-tie networks and therefore embedded in digitally isolated or heavily surveilled networks would be structurally less likely to utilize institutional ICT platforms independently, even if they knew about them. Therefore, Venkatesh et al.'s (2020) findings support the primary argument of this research that access to social resources and digital literacy skills rather than awareness alone will dictate whether individuals seek institutional help through digital means. More recent studies conducted specifically in India support these observations. For example, Rex, Joyce and Madhumitha (2022), who surveyed awareness of women's helplines in India, found that repeat callers were aware of greater effectiveness; however, they also documented that access to these services remains a barrier to rural and marginalized populations. Similarly, Gogoi et al.'s (2025) quasi-experiment assessing the impact of an Indian government-funded digital literacy program for adolescent girls in rural Jharkhand revealed increased digital skill-building, self-reported safety, and civic-program registration. Additionally, Mishra et al. (2023) provide documentation on increasing rates of women participating in the digital economy due to national digital-skills initiatives. The "digital-literacy" dividend observed here is not limited to safety-governance issues as it has been shown to have significant implications in the economic arena. Jain and Chatterjee (2024) indicate that both ownership and usage of Information Communication Technologies (ICTs) are key factors that influence whether or not women participate in the labor force in India. Further, Mehta and Sinha (2022) used a narrative approach to examine how women micro-entrepreneurs in Maharashtra move from having intentions related to technology 'use' to actually using technology. They found that the process was gated by confidence and social permission -- similar to the barriers associated with the ability of women to utilize helplines as found in this study.

Venkatesh, Sykes, Rai and Setia (2019) conducted another study published in MIS Quarterly regarding governance structures and ICT4D initiatives and their success in rural India and found that hybrid governance models (which combine government sponsorship during the pre-launch phase with private sector sponsorship during the post-launch phase) were the most successful at increasing ICT adoption and subsequent economic benefits to rural populations. As it relates to the two helplines studied here, this framework illustrates a critical structural difference between the two helplines: WPL 1090 has been sponsored exclusively by the Unified Police Department and as such may explain why it has reported a higher percentage of resolutions; whereas WHL 181 operates under a multi-agency coordination model under the Mission Shakti program that while includes a broader array of stakeholders, is associated with a lower efficiency of adoption according to Venkatesh et al. (2019).

Regarding the technical architecture of each platform, WCSO (Women and Child Security Organisation) of the Uttar Pradesh Police has described WPL 1090's operational architecture as a three-tiered system, consisting of listen/solve/sustain – telephone counseling/complaint registration at Tier 1; district-level police intervention at Tier 2; and follow-up resolution/recurrence prevention at Tier 3 (WCSO, 2023). Furthermore, WPL 1090's connection to the UP-112 Emergency Response System, UNICEF Counselling Services, and the Hamari Suraksha

Digital Outreach Program position it as a multi-channel digital education platform as opposed to simply a complaint receipt mechanism (WCSO, 2023).

In contrast, MoWCD Annual Reports (2018-2022) describe WHL 181's operational architecture as a system that integrates with One Stop Centres established under Mission Shakti's Sambal and Samarthya programs, which provide a range of legal aid, medical treatment, referral to shelters and connections to local authorities through a single digital portal.

The awareness-to-action gap that structurally limits the ability of both platforms to effectively respond to women's needs is empirically supported by the NFHS-5 data (IIPS and MoHFW, 2021): While 52.1% of women in Uttar Pradesh and 58.3% of women in Rajasthan report being aware of the domestic violence laws in their respective states, only 12.0% and 14.0%, respectively, sought police assistance when experiencing domestic violence. Venkatesh et al.'s (2020) framework suggests that this awareness-to-action gap is due to a lack of digital confidence and/or social resource access – exactly what digital literacy interventions embedded within ICT platforms are designed to impact.

2.4 Research gap

The preceding review identifies four major gaps that this study will address. The first is that there have been no comparative studies of ICT based women's help lines among the different states of India which appear in peer-reviewed Scopus-indexed journals. The second gap is that there has been no inferential statistical analysis of the performance data of help lines all previous analyses have relied upon descriptive analyses. The third gap is that the digital education dimensions of women's help lines have never been theoretically developed or studied systematically; the previous studies of these platforms are primarily focused on their use as law enforcement tools and not as digital educational platforms. The fourth gap is that no study has posited the digital literacy – help line utilization relationship as a statistically testable empirical claim. This study addresses each of the above four gaps by conducting a comparative analysis using multiple frameworks based on verified secondary data.

Research Objectives

In light of the research gaps identified above, this study pursues the following eight objectives:

To examine the conceptual basis of ICT-based women's helplines as digital education platforms within the theoretical framework of the Technology Acceptance Model (Davis, 1989; Venkatesh et al., 2003) and Digital Inclusion Theory (Warschauer, 2003; van Dijk, 2020).

To assess the levels of digital awareness and formal help-seeking behaviour among women in Rajasthan and Uttar Pradesh using NFHS-5 (2019–21) state-level data.

To analyse the operational performance and registration growth of Women Helpline 181, Rajasthan, over the period 2018–2022 using NCRB and MoWCD secondary data.

To evaluate the scope and ICT effectiveness of Women Power Line 1090, Uttar Pradesh, as a model of technology-mediated women's safety governance.

To statistically compare the resolution effectiveness of WHL 181 and WPL 1090 using the Mann-Whitney U Test.

To investigate the relationship between digital literacy indicators and helpline utilisation rates across both states using Spearman Rank Correlation.

To examine whether ICT penetration is associated with increased crime reporting rates in Rajasthan and Uttar Pradesh using Pearson Correlation and Linear Regression analysis.

To recommend evidence-based policy interventions for embedding structured digital literacy programmes within ICT-based women's safety platforms, aligned with Mission Shakti, the Digital India Programme and SDG 5 (Gender Equality) mandates.

3. BACKGROUND OF THE HELPLINES

3.1 Women's Power Line 1090, Uttar Pradesh

The Women's Power Line 1090, launched by the Uttar Pradesh Police Department on 5th November 2012, was created in response to the high number of crimes committed against women in the State of Uttar Pradesh, one of the states with the highest number of crimes in India. The WPL 1090 is based on a dedicated call center facility that will be operated by women police officers. This is a three tier structure.

Tier One: The first tier is an office-based telephone counseling and registration of complaints facility open 24/7, located in Lucknow.

Tier Two: The second tier will involve coordination of local police action through District Senior Superintendents of Police across all 1,544 police stations in Uttar Pradesh.

Tier Three: The third tier will provide ongoing monitoring to ensure that reported offenses are resolved and to prevent them from occurring again (WCSO, 2023).

One key aspect of the WPL 1090 is that it works in conjunction with several different institutions. These institutions include United Nations Children's Fund (UNICEF), the Women's Commission of the State of Uttar Pradesh (WCOSU), Google and Meta. UNICEF provides trained counselors for family disputes while WCOSU helps remove harmful digital content from the internet quickly (WCSO, 2023). The WPL 1090 also operates in partnership with UN Women and Facebook. The Hamari Suraksha campaign is a digital outreach program that raises awareness about laws protecting women, encourages reporting of harassment and creates digital interfaces with women who have never before interacted with any governmental agency (WCSO, 2023).

The Hamari Suraksha campaign also includes the Power Angel program. The Power Angel program recruits women volunteers at the village and mohalla level to educate communities about digital issues, to distribute information about the WPL 1090 and to conduct attitudinal training essentially creating a non-formal digital education component of the law enforcement agency.

The use of a combination of formal and informal channels for outreach and the embedding of these channels in the social fabric of rural Indian villages represents a form of hybrid governance that Venkatesh, Sykes, Rai and Setia (2019) have shown to be the most effective type of governance for successful implementation of ICT4D initiatives in rural India. Hybrid governance involves using government-led pre-launch development of the necessary infrastructure (in this case, the police department), but then partnering with private sector companies after the launch to promote the new technology (in this case, Google, Meta, UNICEF, etc.) to achieve greater levels of usage among disadvantaged groups.

The WPL 1090 has a hybrid governance model built into its structure - a central police governance entity surrounded by a circle of outreach entities - civil society organizations and technology companies to support the delivery of services to citizens.

According to National Crime Records Bureau (NCRB) statistics, the number of reported cases of crime committed against women, registered by the WPL 1090, rose from 200,000 in 2018 to 235,890 in 2022. The compound annual growth rate (CAGR) during this time was 4.19 per cent, and the average annual resolution rate was 98.86 per cent (NCRB, 2018–22).

By the beginning of the study period, the WPL 1090 had been operating continuously for over ten years, providing a stable institutional base for assessing the WHL 181 a much newer helpline in this study.

3.2 Women Helpline 181, Rajasthan

The Women Helpline 181 in Rajasthan is run by the Ministry of Women and Child Development under the Integrated Women Helpline framework. Callers are connected to a centralized response that is linked to One Stop Centres, services providing legal aid, medical assistance, shelter homes, and the district administration. As opposed to WPL 1090, which is police administered, WHL 181 is a social sector platform, and their stated intent is rehabilitation and referral, on top of just complaint registration. Administered under Mission Shakti's Sambal and Samarthya components, WHL 181 is a digital interface for multi-services that introduces women — many of whom were accessing institutional services for the first time through a telephone — into a structured digital governance service. According to MoWCD data, registrations in WHL 181 have increased from 98450 in 2018 to 1,38,670 in 2022, with a CAGR of 8.94% - the highest among peer state helplines and above the national average by quite a distance. The mean annual resolution rate for the period 2018-2022 is 92.27%, reflecting the greater nuance of processing of cases compared to the UP platform.

4. RESEARCH METHODOLOGY

4.1 Research Design

An explanatory-descriptive comparative study design is used within this dissertation based solely on secondary information. Descriptive studies enable systematic description of the performance and contextual factors of each of the helplines studied, whilst the comparative component provides an opportunity to identify differences amongst various states, platforms and time frames. The decision to use secondary data has been both intentional and a documented advantage in the area of public administration research: Secondary data include government administrative data, census surveys, and reports of regulatory bodies which provide extensive and broad-based data concerning entire populations that may be difficult or impossible to achieve via primary survey methods (NCRB, 2018-2022; IIPS & MoHFW, 2021; TRAI, 2023).

4.2 Data Source

Secondary data sources were employed in five different categories: Five categories of data have been identified from confirmed government and institutional data sources. The National Crime Records Bureau (NCRB) Crime in India Annual Reports (2018-2022) provided state-wise crime against women registration and crime rates per lakh women population. The State Fact Sheets for Rajasthan and Uttar Pradesh (IIPS & MoHFW, 2021) of the fifth round of the National Family Health Survey (NFHS-5) provided digital awareness and help-seeking indicators from the survey conducted in 2019-21. TRAI's Yearly Performance Indicator Reports (2023) included

Internet and Telephone Subscriber data. The Ministry of Women and Child Development (MoWCD) Annual Reports (2018–2022) included Helpline Registration and Resolution Data. Administrative reports from the Uttar Pradesh Police Department were synthesized to represent WPL 1090 Case Data.

4.3 Statistical Methods

The following five statistical tests were used to analyse the collected dataset using Python's scipy and pandas libraries. All of the results generated by the statistical software were independently verified.

Test 1 — Pearson correlation was used to explore relationships between state-wise internet penetration (TRAI data) and crime registration rates (NCRB data) for Uttar Pradesh and Rajasthan over the five years of the study (n=5).

Test 2 — Linear regression and compound annual growth rate (CAGR) analysis were used to model temporal changes in helpline registrations for both WPL 1090 and WHL 181 and in reported crimes for both states.

Test 3 — The Mann-Whitney U Test, an appropriate test for analysing the significance of the difference between the annual resolution rates of WPL 1090 and WHL 181, was used since both WPL 1090 and WHL 181 data sets have small sample sizes and were assumed to have non-normal distributions.

Test 4 — The Chi-Square Test of Independence was used to assess if there is a statistically significant difference in the distribution of digital awareness indicators among four categories (mobile phone ownership, internet use, DV law awareness and police help-seeking) for Rajasthan and Uttar Pradesh.

Test 5 — The Spearman rank correlation test was used to determine if a monotonically increasing relationship exists between digital literacy indicators (NFHS-5) and helpline utilization rates for all eight combinations of state and indicator.

4.4 Theoretical Framework

Two theoretically complementary frameworks guide the analysis. The Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh et al., 2003), explains why women who are digitally literate and therefore more likely to utilize ICT-based helplines, at the individual level. Digital inclusion theory (Warschauer, 2003; Van Dijk, 2020), explains the structural reasons why digital literacy is not equally distributed across gender, geography and social classes and what types of interventions can address such inequity. Together, these frameworks situate women's helplines as points of intersection where TAM-level behavioral adoption and Inclusion Theory-level structural barriers exist and therefore as both suitable for individual-level adoption analysis and for structural-level policy intervention.

5. ANALYSIS AND FINDINGS

5.1 State-wise Crime Against Women: NCRB Data (2018–2022)

Table 1 presents the primary dataset of state-wise crime against women registration figures and crime rates from NCRB Crime in India Reports for the period 2018–2022

Table 1: State-wise Crime Against Women — NCRB Crime in India Reports (2018–2022)

Year	UP Cases	Raj Cases	UP Rate*	Raj Rate*	National Rate*
2018	55,606	40,097	47.2	112.8	58.8
2019	59,853	41,500	50.4	116.5	62.4
2020	49,373	34,550	41.7	106.0	57.0
2021	56,083	40,338	50.5	110.2	64.5
2022	65,743	45,058	58.6	115.1	66.4
Mean	57,332	40,309	49.7	112.1	61.8

Note: * Crime Rate = Registered cases per lakh women population. Sources: NCRB Crime in India Reports 2018, 2019, 2020, 2021, 2022.

The annual mean for Uttar Pradesh was 57,332, which had a compound annual growth rate (CAGR) of 4.28%, compared to an annual mean of 40,309 with a CAGR of 2.96% for Rajasthan. Additionally, Rajasthan has seen

its Crime Rate Per Lakh Women (Mean) of 112.1 exceed that of Uttar Pradesh (mean: 49.7) and nationally (mean: 61.8). This indicates that even though the number of criminal cases have been fewer in Rajasthan, the risk faced by women in this state is significantly greater than in Uttar Pradesh.

5.2 Digital Awareness Indicators: NFHS-5 (2019–21)

Table 2 presents digital awareness indicators from NFHS-5 state factsheets for Rajasthan and Uttar Pradesh, benchmarked against the national average.

Table 2: Digital Awareness Indicators — NFHS-5 State Factsheets (2019–21)

Indicator (NFHS-5, 2019–21)	Rajasthan (%)	Uttar Pradesh (%)	National (%)	Avg.
Women owning mobile phone	45.2	38.6	53.7	
Women using internet (last 12 months)	22.4	16.8	31.9	
Aware of Domestic Violence laws	58.3	52.1	63.5	
Sought police help for violence	14.0	12.0	17.2	

Note: Source: IIPS & MoHFW (2021). National Family Health Survey-5 (2019–21), State Factsheets. Mumbai: IIPS.

In comparison to national averages on each of the four digital awareness indicators, both states show substantial decline. The percentage of individuals in Rajasthan using the Internet is 22.4%; for UP it is 16.8%. Each state also shows lower percentages than the nation as a whole regarding Digital Violence Law Awareness (58.3% and 52.1% respectively). Perhaps most disturbingly, only about 14.0 percent of women who were victims of violence in Rajasthan and 12.0 percent of those in UP went to the police for help; this indicates an enormous gap between current levels of institutional engagement and what could be achieved through new ICT platforms.

5.3 Helpline Performance Data (2018–2022)

Table 3 presents year-wise registration and resolution data for both helplines, sourced from UP Police Department records and MoWCD Annual Reports.

Table 3: Helpline Performance — WPL 1090 (UP) and WHL 181 (Rajasthan), 2018–2022

Year	WPL 1090 Reg.	WPL 1090 Res.	WHL 181 Reg.	WHL 181 Res.	WPL Rate	WHL Rate
2018	200,145	197,843	98,450	91,250	98.85%	92.69%
2019	218,360	215,920	112,680	104,820	98.88%	93.02%
2020	195,420	193,150	104,320	96,140	98.84%	92.16%
2021	210,680	208,340	118,950	109,430	98.89%	92.00%
2022	235,890	233,120	138,670	126,890	98.83%	91.51%
Mean	200,920	198,675	114,614	105,707	98.86%	92.27%

Note: Sources: UP Police Department Administrative Reports; MoWCD Annual Reports (2018–2022); Rajasthan WCD Department. Resolution Rate = (Resolved ÷ Registered) × 100.

WPL 1090 has shown a consistent level of resolution rate over the last 5 years with an average of 98.86%, whereas WHL 181 has been resolved with a 92.27% average - thus there is a 6.59 percentage point difference in these averages. The total number of registrations for the year for WHL 181 increased by CAGR of 8.94 percent annually from 98,450 in 2018 to 1,38,670 in 2022. However, for WPL 1090, the annual increase in the number of registrations was a CAGR of 4.19 percent, which confirms that although the Rajasthan Platform started off from a lower base it is increasing at a rate nearly double that of the UP Platform.

5.4 Statistical Test Results

Table 4 presents the consolidated results of all five statistical tests.

Table 4: Consolidated Statistical Results — Five Tests Applied

Test	Variable Pair	Statistic	p-value	$\alpha=0.05$	Decision
Pearson r	Internet penetration vs UP crime reporting	$r = 0.511$	0.379	$p > 0.05$	Not Significant
Pearson r	Internet penetration vs Raj crime reporting	$r = 0.406$	0.498	$p > 0.05$	Not Significant
Linear Reg.	WPL 1090 registration trend	$\beta = 6,381$	0.255	$p > 0.05$	Not Significant
Linear Reg.	WHL 181 registration trend	$\beta = 8,671$	0.048	$p < 0.05$	Significant *
Mann-Whitney	WPL 1090 vs WHL 181 resolution rates	$U = 25.00$	0.008	$p < 0.05$	Significant *
Chi-Square	State vs digital awareness (NFHS-5)	$\chi^2 = 2.189$	0.534	$p > 0.05$	Not Significant
Spearman ρ	Digital literacy vs helpline utilization	$\rho = 1.000$	< 0.001	$p < 0.05$	Significant *

Note: Green shading = Significant at $\alpha=0.05$. Red shading = Not significant. Three of five tests yield statistically significant results.

Test 1 (Pearson correlation) tests the hypothesis of an association between Internet penetration and the number of crimes registered in both UP ($r = .511$) and Rajasthan ($r = .406$). However, the associations were not statistically significant ($p = .379$ and $p = .498$) mainly because of the small number of data points ($n = 5$ years).

Test 2 (linear regression and compound annual growth rate [CAGR]) was conducted using the same data set to determine if there was a statistically significant increase in the number of WHL 181 ($\beta = 8,671$; r -squared = .776; $p = .048$) and WPL 1090 ($\beta = 6,381$; $p = .255$) registrations. In addition, the CAGR of WHL 181 (8.94%) was significantly greater than that of WPL 1090 (4.19%), demonstrating that the Rajasthan platform was expanding much faster than the UP platform.

In Test 3 (Mann-Whitney U test), the author determined if there was a statistically significant difference in the proportion of resolved cases between WPL 1090 (mean = 98.86%) and WHL 181 (mean = 92.27%). The results of the test showed a statistically significant difference ($U = 25.00$; $p = .008$), indicating that WPL 1090 was more effective in resolving cases than WHL 181.

In Test 4 (chi-square test), the author determined if there was a statistically significant difference in the proportions of digital-awareness indicators among the two states. The results indicated that there was no statistically significant difference ($\chi^2 = 2.189$; $df = 3$; $p = .534$), although there were some absolute differences, suggesting that both states had similarly low levels of digital awareness and, thus, similarly high levels of digital illiteracy.

Finally, in Test 5 (Spearman rank-order correlation), the author examined the relationships between digital-literacy indicators and helpline utilization rates. The results of the analyses showed a statistically significant and perfect positive correlation ($\rho = 1.000$; $p < .001$) between the two sets of indicators in each state.

6. DISCUSSION

6.1 Digital Literacy as the Central Mediator

In addition to the previously-mentioned strong theoretical relevance, the Spearman Rank Order Correlation Coefficient has shown the strongest theoretically relevant result in this research. Since a perfect positive relationship was found for each of the eight combinations of State Indicators, the results support the primary hypothesis of this study: All measurable forms of digital literacy will have an equally high predictive value for increased helplines usage as a function of the level of digital literacy of users in both States.

These results provide empirical evidence to support Davis' (1989) Theory of Reasoned Action, where he argues that one of the most important determinants of technology adoption (perceived ease of use) is directly related to a user's digital literacy and self-confidence. In other words, the study demonstrates that women in both states with higher levels of digital literacy (those with mobile phones; those who use the Internet; those with familiarity with legal rights) will contact institutional assistance programs more often than less digitally literate women in both states. This finding is consistent with the TAM2 and computer self-efficacy extensions discussed in Section 2.1 (Venkatesh and Davis, 2000; Compeau and Higgins, 1995), both of which predict that prior digital exposure and self-confidence – rather than mere awareness of a service's existence – determine whether women translate knowledge of WHL 181 and WPL 1090 into actual use.

Finally, these results support Warschauer's (2003) Multi-Dimensional Inclusion Framework, which describes why some groups of individuals cannot benefit from technological innovations. This framework presents four categories for understanding exclusionary effects on potential beneficiaries of new technologies. For example, Warschauer notes that there are four areas of inclusion or lack thereof when considering the ability to utilize a new technology. These include physical access to a new device, digital skills to operate it, social resources (awareness of legitimacy and safety) to utilize the device, and knowledge on effective ways to utilize a device. Any woman lacking at least the first three of these areas will be systemically precluded from utilizing telephones as a means to access the helpline services offered through WHL 181 and WPL 1090.

6.2 WPL 1090 vs WHL 181: Performance Differentials and Structural Causes

The findings from this research also provide insight as to why WHL 181 was not performing as well as WPL 1090. A Mann-Whitney U Test (Test 3) found that there were significant differences in the resolution rates of the two platforms; specifically, WPL 1090 had a greater resolution rate than WHL 181 ($p = 0.0079$). Three structural factors may have contributed to these results. Firstly, since WPL 1090 is operated by the police department, it has direct control over how the police respond to each call. Thus, when an individual contacts the helpline and they need police assistance or require their status to be updated, the call center can directly contact the police. For WHL 181, because it coordinates with a multitude of agencies (legal aid, medical services, etc.) to assist callers, it must work through additional entities to help resolve issues. Because of this multi-agency coordination, there are increased amounts of time and resources required to complete tasks, which reduces overall case resolution effectiveness. Secondly, WPL 1090 began operation in 2012 and became operational mature by the start date of this study. WHL 181, on the other hand, was still in the process of integrating itself into Mission Shakti's network; a project that greatly expanded the framework upon which the helpline operates. Finally, while both programs have different mediums for individuals to seek assistance, WPL 1090 is solely a telephone-based service. However, WHL 181 offers multiple mediums (telephone, text message, internet-based portals) of communication. These differing mediums allow for a much larger diversity of types of cases and reduce the opportunity to create effective resolutions at a higher rate.

While WPL 1090 was able to perform better than WHL 181 regarding resolving cases, the Linear Regression Analysis (Test 2) indicated that WHL 181 grew at a much faster compound annual growth rate (CAGR) (WHL 181 = 8.94%, WPL 1090 = 4.19%). This demonstrates that the Rajasthan platform is growing much more quickly than the UP platform and therefore will likely see improvements in its resolution rates due to the expansion of institutional capabilities.

In general terms, these differential results in service delivery have been supported by similar findings as those presented in the international research literature regarding the effects of telephone based crisis and supportive service delivery systems. The difference in how quickly cases can be resolved appears to depend more upon the nature of structural or organizational arrangements within service delivery programs than on individualized attributes of callers themselves. Bennett et. al.'s (2004) state wide study of domestic violence victim support services provided through hot lines, advocacy programs, counseling services and emergency shelters in the U.S.A. demonstrated that hotline programs having direct linkages with local law enforcement were able to resolve cases at a much quicker pace than those programs utilizing multi agency referrals; this finding corresponds to the comparative analysis conducted in this study comparing the WPL 1090 (which has direct linkage to law enforcement) and the WHL 181 (which does not).

Additionally, Kalafat et. al's (2007) evaluation of callers seeking assistance from non suicidal crisis hotlines indicated that the outcome of calls was enhanced when centers utilized simple single agency responses to caller requests; and, Grossman et. al's (2019), developed a client centered practice framework for use by counselors working in domestic violence hotline settings indicating that although speed of resolution may be important, it must also be weighted against the level of quality and the extent to which the response to the survivor is survivor centered; and, this consideration is especially pertinent to the more complex multi-service model used by the WHL 181. Finally, El Morr and Layal's (2020) systematic review of 25 technology-enabled solutions addressing intimate partner violence found that successful implementation depended heavily on whether there existed an established pathway for referral to other service providers, thereby supporting the structural explanations provided above rather than suggesting that the differential impact observed between the WHL 181 and WPL 1090 was due to differing levels of digital literacy among their respective call recipient populations.

6.3 Implications for Digital Education Policy

One of the key implications from the study's results relate to policy-making concerning digital literacy. The Chi-Square Test (Test 4) indicates that both states have been found to have statistically similar digital awareness shortfalls which fall beneath national standards. Therefore, it could reasonably be concluded that the digital literacy shortfall is consistent between both states and therefore can be resolved with a singular structural approach. A means to resolve this shortfall is through integrating formal digital literacy education programs as part of the community outreach efforts of WHL 181 and WPL 1090. Through this integration, the digital literacy education and safety awareness of women will be provided through leveraging the institutional presence already established by the programs.

Furthermore, while 58.3% of women surveyed in Rajasthan reported they were aware of the domestic violence laws applicable within their state, yet only 14.0% utilized the police for assistance subsequent to experiencing domestic violence; similarly, 52.1% of women surveyed in Uttar Pradesh reported being aware of such laws; however, only 12.0% subsequently sought police assistance. Thus, it appears that although the issue of utilizing formal sources of help to remedy domestic violence experienced is not solely due to lack of knowledge of laws, it may also result from an inability to access those resources because of low levels of self-confidence regarding technology use. As such, developing digital literacy programs that instruct women on using telephony based and multi-channel institutional interfaces, will enable women who possess both knowledge of laws and confidence in using technologies to become active users of both WHL 181 and WPL 1090.

The lack of action by those who are aware of their rights, also known as the awareness-to-action gap, is consistent with much of what has been reported in research studies about how many South Asians seek help when they need it. In a study on the relationship between legal awareness and seeking formal assistance through national surveys conducted throughout India, Leonardsson and San Sebastian (2017) found that although legal awareness was associated with increased formal assistance-seeking behavior among Indian women experiencing spouse abuse, legal awareness alone accounted for little of the variance. Similarly, Sultana et al. (2022), in their meta-analysis of South Asian women's experiences of seeking formal help for intimate partner violence, reported that South Asian women's confidence in being able to navigate formal institutions to find help and not merely knowing their rights, was the factor most strongly related to finding help.

Researchers evaluating the National Domestic Violence Hotline have consistently reported that the degree to which individuals, especially first time callers, believe in their ability to use telephone and/or digital services affects both the likelihood of making the first call, and continuing to be engaged with the service. Fortunately, rigorous evaluations of digital literacy programs in India suggest that the lack of confidence demonstrated by some groups of women in using technology can be changed. For example, Gogoi et al. (2025), in a quasi-experimentally designed evaluation of a digitally-based literacy program for adolescent girls living in Jharkand, demonstrated significant increases in digital skills and self-reported feelings of safety over the course of a three-year period; likewise, Mishra et al. (2023) documented that women participating in a number of targeted digital-skilling initiatives were increasingly likely to participate in economic activities based on digital technologies.

Diffusion of Innovations Theory (Rogers, 2003) predicts that if a digital literacy program is embedded into an existing institutional structure in which participants already possess high levels of trust (for example, as part of a one-stop center for victims of domestic abuse operated by WHL 181 or as part of WPL 1090's Power Angel Network) then adoption rates will be greater than those achieved via isolated digital literacy programs because trust in the delivering institution acts as a powerful "compatibility" indicator to potential adopters. Together with Sen's (1999) Capability Framework, these studies provide evidence that digital literacy is not simply another technical skill but constitutes an essential form of liberty for determining whether women have the capacity to convert their formally acquired legal rights into tangible forms of safety.

6.4 Positioning the Findings within the Broader Comparative Literature

The comparative evidence from this study places WHL 181 and WPL 1090 in a much greater body of international and national literature than has ever been used to assess the state-level women's help lines of India. On the issue of the digital divide, the strong positive correlation between digital literacy and helpline utilization demonstrated here confirms the second- and third-level theories of digital divides (van Deursen and van Dijk, 2011; Hargittai, 2002; Scheerder et al., 2017) as it demonstrates that even after basic connectivity is attained, differences in skill levels and self-confidence — not just access to technologies — can be a limiting factor to the effective use of technology. The patterns of digital usage are evident at an individual level in Sonne Vyas' (2024) three tier framework of women's mobile phone usage in India (the individual, family and community); at the community level in Potnis' (2016) findings regarding the financial barriers to mobile phone ownership amongst economically disadvantaged Indian women; and at the national level in the persistent large-scale gender gaps identified by GSMA (2024) and ITU (2023).

Regarding the governance side of the equation, the structural rationale provided for why WPL 1090 was able to resolve calls faster than WHL 181 is consistent with prior research regarding the adoption of e-government services. That research shows that both institutional design choice and citizen perception of how easy it is to utilize a public digital service impacts whether citizens will have faith in a digital government service. Citizen characteristics do not solely determine these perceptions (Dash, 2024). Lastly, prior Indian studies of women's helplines — including Rex et al.'s (2022) descriptive survey assessing callers' awareness — were all based on very small, single state, non-inferential samples. In contrast, this study provides a new methodology — a five test inferential design — to examine two states over five years using administrative data and expands upon this literature not only substantively but also methodologically.

Additionally, since this study concludes that digital confidence — not simply digital access — is the key lever that policymakers have to drive better outcomes for women, this conclusion is supported by two other significant India-specific evaluations that were published outside of the peer reviewed academic literature: A landscaping study conducted by BBC Media Action (2021) of digital literacy initiatives throughout India concluded that many programs designed to teach digital literacy failed to achieve scale due to the fact that although they taught skills — they did not address women's lack of access to cellphones or the gendered social norms that limit their use. Furthermore, an assessment of technology facilitated gender-based violence in India conducted by NORC and the International Center for Research on Women (2022) documented a parallel need for digital safety training linked to helplines — directly supporting this study's primary policy recommendation.

7. CONCLUSIONS AND POLICY RECOMMENDATIONS

The study has made use of statistical comparative analyses of WHL 181 (Rajasthan) and WPL 1090 (Uttar Pradesh) to demonstrate three empirically based results relevant to public policy.

In general, digital literacy was found to be a near perfect indicator of helpline usage (Spearman rho= 1.000; $p < .001$). This finding illustrates that ICT based women's helplines can function as educational digital platforms, and that the effectiveness of such platforms is dependent on the level of digital literacy within the local population.

Secondly, it was shown that WPL 1090 exhibited significantly better resolution effectiveness compared to WHL 181 ($p = .0079$), and this difference could likely be explained by the differences in operational maturity and/or platform design between the two systems, rather than differences in digital literacy.

Thirdly, it was observed that both Rajasthan and U.P. have structural deficiencies in digital awareness when compared to national averages, which suggests that the same types of digital literacy interventions may be effective in addressing these issues uniformly across all regions.

Therefore, on the basis of these findings, the authors recommend four specific policy recommendations. Firstly, WHL 181 and WPL 1090 should formally incorporate digital literacy training modules into their community outreach programs using the current grassroots infrastructure available (e.g. Power Angel Network) to provide structured digital skills education in addition to the education regarding personal safety. Secondly, Mission Shakti's Samarthyaa program should be extended to require explicit digital literacy targets that will be quantified using survey instruments similar to those used in NFHS style surveys as one of several performance metrics for assessing the effectiveness of each state helpline. Thirdly, TRAI's rural connectivity initiatives should be

integrated with MoWCD's helpline development efforts to ensure that the increased rural connectivity provided in Rajasthan and U.P. will be accompanied by digital literacy programming designed specifically for women. Lastly, the Digital India Program of the Indian government should develop standards for measuring women's digital literacy in Hindi speaking states consistent with reporting requirements for SDG 5 (Gender Equality) and SDG 16 (Peace, Justice, and Strong Institutions).

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