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Empowerment of Rural Women through ICT: A Sociological Study of Kanpur District of Uttar Pradesh

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Abstract

Information and Communication Technology (ICT) has emerged as a transformative force for empowering rural women by improving their access to education, livelihood, health services, and community participation. Grounded in the perspectives of digital inclusion, Gender and Development (GAD), and Sen's capability approach, this study examines the role of ICT in enhancing socio-economic independence, mobility, and decision-making power among rural women in Kanpur, Uttar Pradesh. Using a mixed methodology involving field visits, interviews, and a survey of 200 women, the study analyzes how ICT—through mobile phones, social media, digital banking, e-governance portals, and Community Media Centres (CMCs)—shapes everyday life and empowerment outcomes. The findings reveal that ICT access significantly enhanced awareness of government schemes, digital literacy, and participation in self-help groups. Women who engaged regularly with ICT reported improved confidence, better health-seeking behavior, and greater economic opportunities, especially in home-based enterprises and market access. However, restrictive factors such as financial barriers, caste and class disparities, and limited infrastructure continue to hinder equitable inclusion. Policy initiatives like Digital India, Mahila E-Haat, and NRLM were found to be relevant but underutilized due to gaps in grassroots implementation. In conclusion, the study affirms that ICT can be a catalyst for inclusive rural development when coupled with enabling structures such as CMC training, SHG models, and gender-sensitive outreach. By expanding women's capabilities and freedoms, ICT not only bridges the digital divide but also contributes to sustainable socio-economic transformation in rural India.

Keywords: Community Media Centres, ICT, Self-Help Groups, Socio-economic development, Women Empowerment.

Introduction

The Association for Progressive Communications opines the new information and communication technologies (ICTs) that can be classified into three groups namely information technology (IT) that uses computers, telecommunication technologies such as telephones, broadcasting of radio and television through satellites as well as the networking technologies such as internet which has extended to mobile phone technology, voice over IP (VoIP) telephony, satellite communication and other forms of communication. As, ICTs are powerful tools that can empower women by enhancing access to education, healthcare, livelihood opportunities, and platforms for social and political engagement. This facilitates skill-building, enable remote learning, and open avenues for women to enter the digital economy through e-commerce, online banking, or virtual employment (1, 2). In rural areas, ICTs have observably played a vital role in bridging the gap between women's status and economic participation, because ICTs allow for the development of individuals innate potential or capabilities through user-friendly exercises and virtual interfaces (3). It empowers individuals to make better choices and participate in social, economic and cultural activities with better skills and knowledge-bases. However, the concept of women empowerment includes several parameters or dimensions, like their roles in decision-making processes, education, health, socio-economic status, financial independence and so on (4).

The upsurge in ICT usage improves the women's condition in rural areas by facilitating income generation through digital livelihoods like using mobile phones, computers, and the internet to engage in home-based businesses, such as

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tailoring, handicrafts, food processing, and online retail. Different platforms like whatsApp, facebook and e-commerce portals allow them to reach wider markets without leaving their villages. However, digital financial tools enabled women to manage their finances securely and independently, reducing dependence on intermediaries or male family members. It facilitates vocational training and skill development programmes through government initiatives, community media centres (CMCs) and self-help groups (SHGs) to provide training in computer literacy, data entry, digital design, and business management (5, 6). These skills will automatically enhance employability and fastens the formal and informal employment, mainly in service sectors and digital industries. For example, in districts like Kanpur, trained women have found work in schools, local businesses, and even started their own enterprises.

In remote areas, the medical infrastructure is limited and gender-based barriers exists. To improve the medical facilities, ICT can provide alternative and better approach to promote healthier lives. The major contribution of ICT in health sector includes increasing health awareness and knowledge dissemination. Through mobile phones, community radio, SMS services, and mobile health apps, women can access vital information related to maternal health, nutrition, child care, hygiene, menstruation, contraception, and disease prevention (7). These platforms offer content in local languages and often feature audio-visual aids, making information more accessible to semi-literate and illiterate populations. ICT-enabled services also facilitate remote health consultations and telemedicine, reducing the need for travel to distant healthcare facilities. Women can receive expert advice from doctors, schedule appointments, and even get diagnostic results through mobile apps or community-based digital kiosks (8). Such services have proven especially valuable in times of public health emergencies or when physical mobility is restricted. Moreover, ICT tools contribute to mental well-being and emotional support. Online forums, WhatsApp groups, and community networks allow women to share experiences, seek guidance, and find emotional comfort reducing feelings of isolation and stress. Health-related content on platforms like YouTube or health blogs further enables women to make informed choices about self-care, exercise, and mental resilience (9). The integration of ICT in public health campaigns such as those focusing on vaccination drives, family planning, or sanitation has also improved outreach and monitoring. Women equipped with digital tools are more likely to participate in such initiatives, increasing community-level impact (10).

As, rural women increasingly engage with digital platforms for education, employment, health, and social interaction, digital safety and cyber-awareness have become essential aspects of ICT empowerment (11). Digital safety encompasses knowledge and practices that protect users from online threats such as data theft, cyberbullying, identity fraud, and exploitation. For many rural women, especially first-time users of mobile phones and the internet, lack of digital literacy makes them more vulnerable to misinformation, scams, and privacy violations. In many cases, phones are shared within households, limiting privacy and increasing exposure to unauthorized access and misuse (12). Awareness programs delivered through Community Media Centres (CMCs), NGOs, or government initiatives play a vital role in educating women about safe digital practices including secure password management, recognizing fake news, avoiding suspicious links, and protecting personal data. Women are also trained to report online abuse and understand the legal protections available to them under cyber laws. Social media, while a powerful tool for expression and networking, also brings risks such as harassment and surveillance. Through targeted training, women learn how to use privacy settings, block/report offenders, and create safe digital spaces.

Theoretical Framework

The present study is grounded in well-established theoretical perspectives. The theory of digital inclusion emphasizes how access, skills, and effective use of ICT can bridge inequalities and enable marginalized groups to participate in the digital economy. From a Gender and Development (GAD) perspective, ICT adoption is not only a technological advancement but also a means to address gender-based barriers that limit women's agency, mobility, and decision-making power. Furthermore, Amartya Sen's capability approach underscores that ICT fosters empowerment when it expands women's real freedoms and capabilities to live the lives they value. These frameworks

provide a strong foundation for assessing the impact of ICT in rural contexts.

Against this backdrop, the study focuses on Kanpur, Uttar Pradesh, where rural women are increasingly interacting with ICT through mobile phones, social media, digital banking, e-governance portals, and Community Media Centres (CMCs). The research seeks to explore how ICT shapes their socio-economic conditions, health awareness, mobility, and decision-making power, while also identifying barriers that restrict digital inclusion. Rather than presenting objectives as a list, the study aims to evaluate ICT as a catalyst for empowerment, examine how CMCs and Self-Help Groups (SHGs) enhance women's digital literacy, and analyze the enabling and limiting factors that affect adoption

Methodology

This study adopted a mixed-methods design that combined qualitative insights from field visits and interviews with quantitative analysis of survey data. The research was conducted in Kanpur district of Uttar Pradesh, an area with both rural and semi-urban settlements, where ICT-based interventions such as Community Media Centres (CMCs) have been established. These centres were selected as focal points for assessing the role of ICT in women's empowerment because they serve as hubs for computer literacy, vocational training, and access to government services.

Sampling Approach and Rationale

A purposive random sampling method was employed to ensure that participants represented a cross-section of women engaged with ICT at different levels. Four clusters with active CMCs—Rail Bazaar, Bansmandi, Bithoor, and Jajmau—were chosen for field visits. From these clusters, 200 women were selected. The sample size was determined based on comparable ICT empowerment studies in South Asia, which typically consider 150–250 respondents sufficient for generating reliable insights in community-based research (4, 13). A sample of 200 also allowed for meaningful statistical comparisons while accommodating resource and time constraints.

Data Collection Methods

Data collection was carried out in two phases. In the qualitative phase, field visits and informal interviews were conducted with local coordinators, trainers, and women beneficiaries to understand the practicalities of ICT use. Observations were recorded on the range of services provided, training delivery, and challenges faced by participants. In the quantitative phase, a structured questionnaire was administered to 200 respondents. The questionnaire focused on nine dimensions: demographic characteristics, socio-economic conditions, awareness and policy engagement, daily ICT usage, social interaction, mobility and work perceptions, health and well-being, gender norms, and digital safety.

Research Questionnaire

We conducted a field survey of 200 rural women from different locations in Kanpur district, as part of our research. The questionnaires were prepared by focusing on various characteristics to analyze the impact of ICT on rural women in Kanpur, Uttar Pradesh.

Respondent Demographics

The survey population included women of diverse age groups, caste categories, education levels, and occupational backgrounds. Among them, 60% belonged to unreserved categories and 40% to reserved categories. Education levels ranged from no formal education (18%) to postgraduate qualifications (6%). Employment categories included homemakers (35%), self-employed women (17%), daily wage laborers (14%), salaried employees (11%), students (8%), and others (6%). This demographic spread ensured that findings reflect the heterogeneity of rural women's experiences in Kanpur.

Data Analysis

Quantitative data from the surveys were analyzed using descriptive statistics, percentages, and graphical representations to capture key trends. These were supported with qualitative insights from interviews and field observations to ensure a holistic understanding of ICT's role in women's empowerment. Triangulation of methods enhanced the validity of findings by cross-verifying responses across data sources.

By combining first-hand field observations with statistical analysis, the methodology ensured both depth and breadth in assessing how ICT contributes to women's empowerment in rural Uttar Pradesh. This approach aligns with previous ICT empowerment studies in rural South Asia,

while tailoring the design to the socio-cultural realities of Kanpur.

Results

The present study deals with the women's empowerment by focusing on various strategies involving ICT. A study of 200 rural women was initially considered to understand demographic characteristics in relation to ICT usage and empowerment. In terms of education, 18% of the respondents represents no formal education, 27% had primary education and 22% had secondary education. Meanwhile, 17 % of the respondents exhibit higher secondary education, 10% had diploma or undergraduate degree and remaining 6 % of the respondents possess postgraduate degree (Figure 1A). The result findings suggested that most of the rural women exhibit a significant proportion of primary education, indicating moderate literacy among the respondents. Based on education level, the employment status of respondents were further assessed to evaluate the income related information. As shown in Fig 1b, 35% were homemakers, 17% were self-employed, 14% were daily waged, 11% were salaried, 9% were unemployed, 8% were student and 6% were others. Furthermore, the distribution of monthly income includes 34% had no income source, 27% earned less than ₹10,000 per month, 20% earned between ₹10,000 and ₹20,000, 13% earned between ₹20,000 and ₹40,000 and 6% earned more than ₹40,000. The data is represented in fig 1c. These figures reveals that high level of economic vulnerability, with 61% earning less than ₹10,000 or having no income at all. Apart from this, the family type indicated that 40% of respondents lived in nuclear families, 30% in joint families and remaining 30% of respondents in extended families. In social background, 40% of the respondents belongs to reserved categories and remaining 60% belongs to unreserved categories. In addition to this, the number of children in rural women includes 30% had no children, 20% had one child, 35% had two children and 15% had three children. The relevant data is represented in Figure 1A-F. These results suggest that background of demographic profile provides a critical foundation for understanding the ICT access, tools and programs.

In terms of socio-economic background, 40% of the respondents had their own land property and 65% were involved in income-generating activities such as agriculture (35%), livestock (15%), daily wage labor (25%), small business (10%), government or private job (10%) and others (5%). However, 40% of the respondents were involved in government subsidies or welfare schemes and 55% had faced financial constraints during education or training. The data is represented in Figure 2A and 2B. In addition to this, approximately 75% of the respondents had access to self or family bank accounts, while 30% were the primary decision-makers in their households. About 55% of the respondents were involved in self help group (SHG) membership. The data is represented in Figure 2C. Through analysing the socio-economic background, it has been strongly suggested the adoption of ICT solutions for livelihood, education and civic participation.

Based on this survey based study, it has been documented that approximately 46.5% of the respondents were aware of government or NGO programs in promoting ICT access and usage for rural women and remaining 53.5% having no such awareness. Besides this, only 35% had actually participated in these empowerment program or digital literacy. The most common sources to receive information for these programs includes Panchayat (35%), NGO/SHG (20%) followed by Social Media (15%) and Television (20%). While, remaining 10 % of the respondents were completely unaware to such communication channels. Among the participants involved in these programs (70 respondents), the most well-known initiative was Digital India (65%), followed by PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan) at 58%, and Beti Bachao Beti Padhao (52%). Other programs includes National Digital Literacy Mission (NDLM) (35%), NGO-led campaigns (28%) and other NGO programs (16.6%). In reference to program effectiveness, only 31.5% believed that current government ICT programs fulfil the needs of rural women, while the remaining 68.5% of the respondents were not satisfied with these programmes. The data is represented in Figure 3A-C. This highlights a critical gap between program design and grassroots-level implementation and awareness.

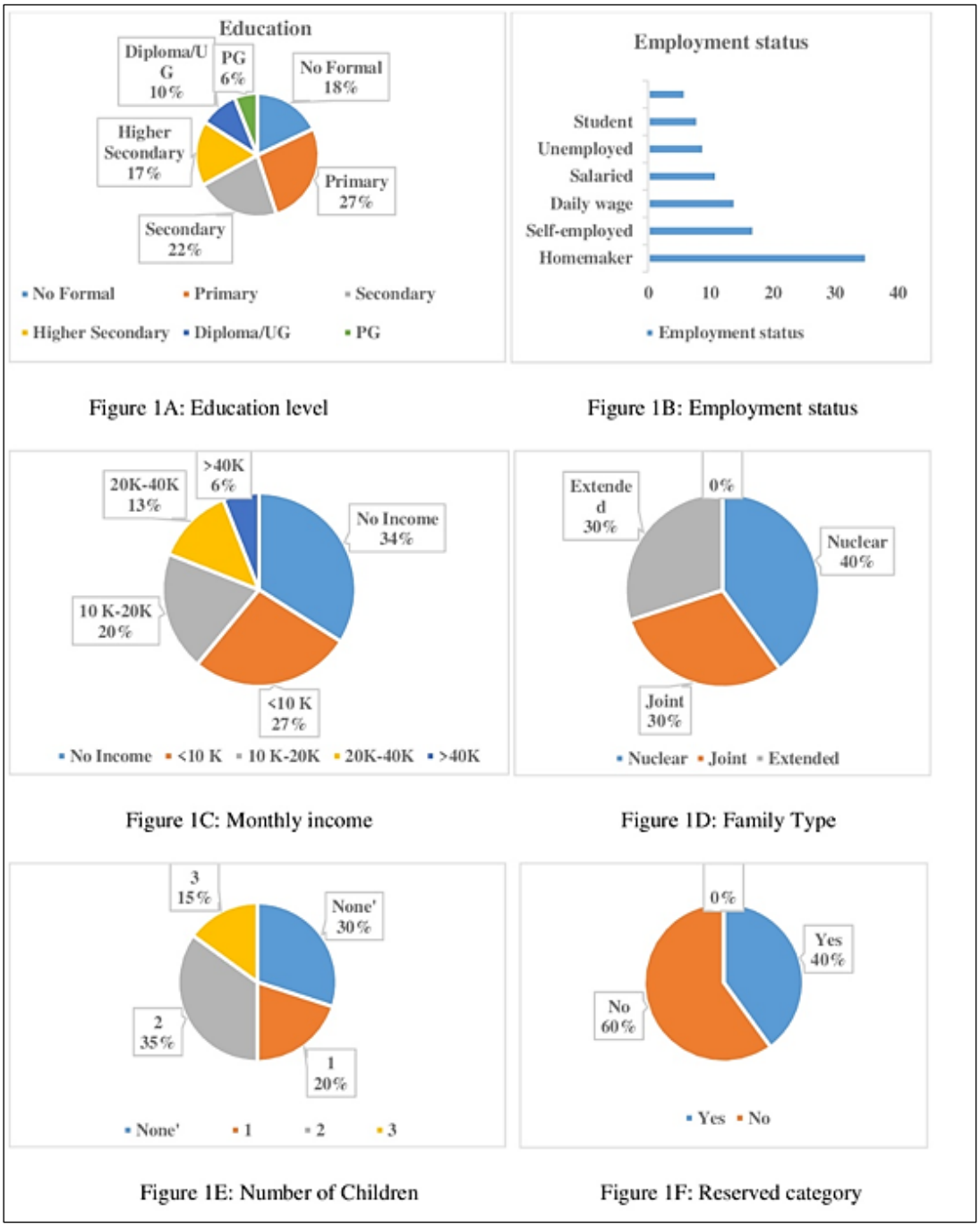

Figure 1A: Education level

Figure 1B: Employment status

Figure 1C: Monthly income

Figure 1D: Family Type

Figure 1E: Number of Children

Figure 1F: Reserved category

Figure 1: Demographic Profile of Rural Women Respondents: (A) Education Level, (B) Employment Status, (C) Monthly Income, (D) Family Type, (E) Number of Children, (F) Reserved Category

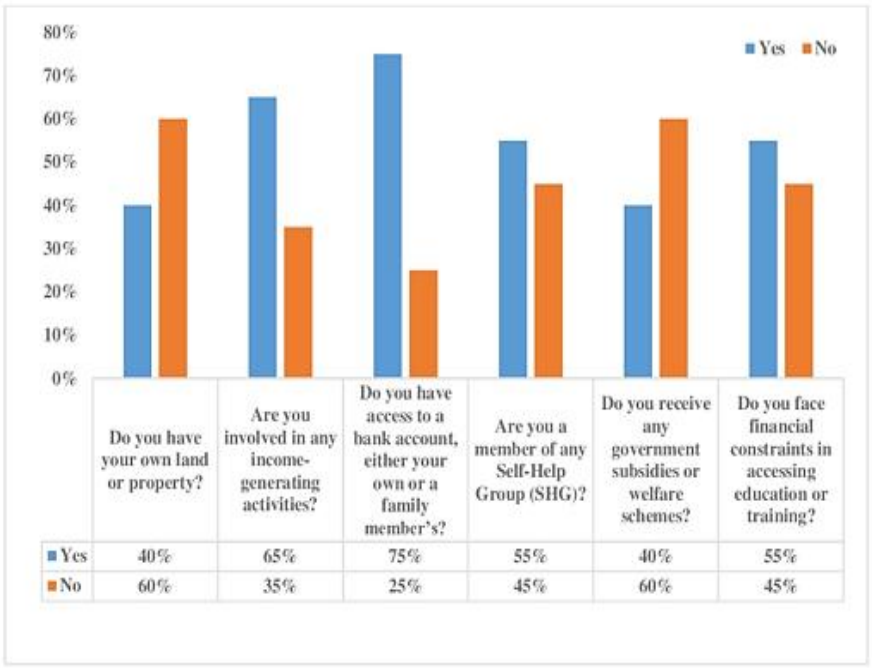

Figure 2A: Land/property ownership

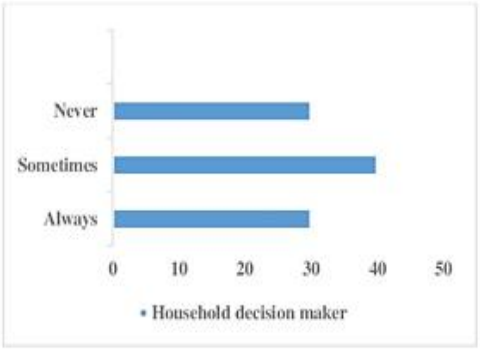

Figure 2B: Household decision maker

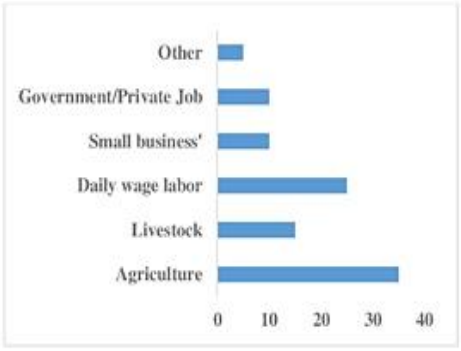

Figure 2C: Livelihood Sources

Figure 2: Socio-Economic Characteristics of Respondents: (A) Land/Property Ownership, (B) Household Decision Maker, (C) Livelihood Sources

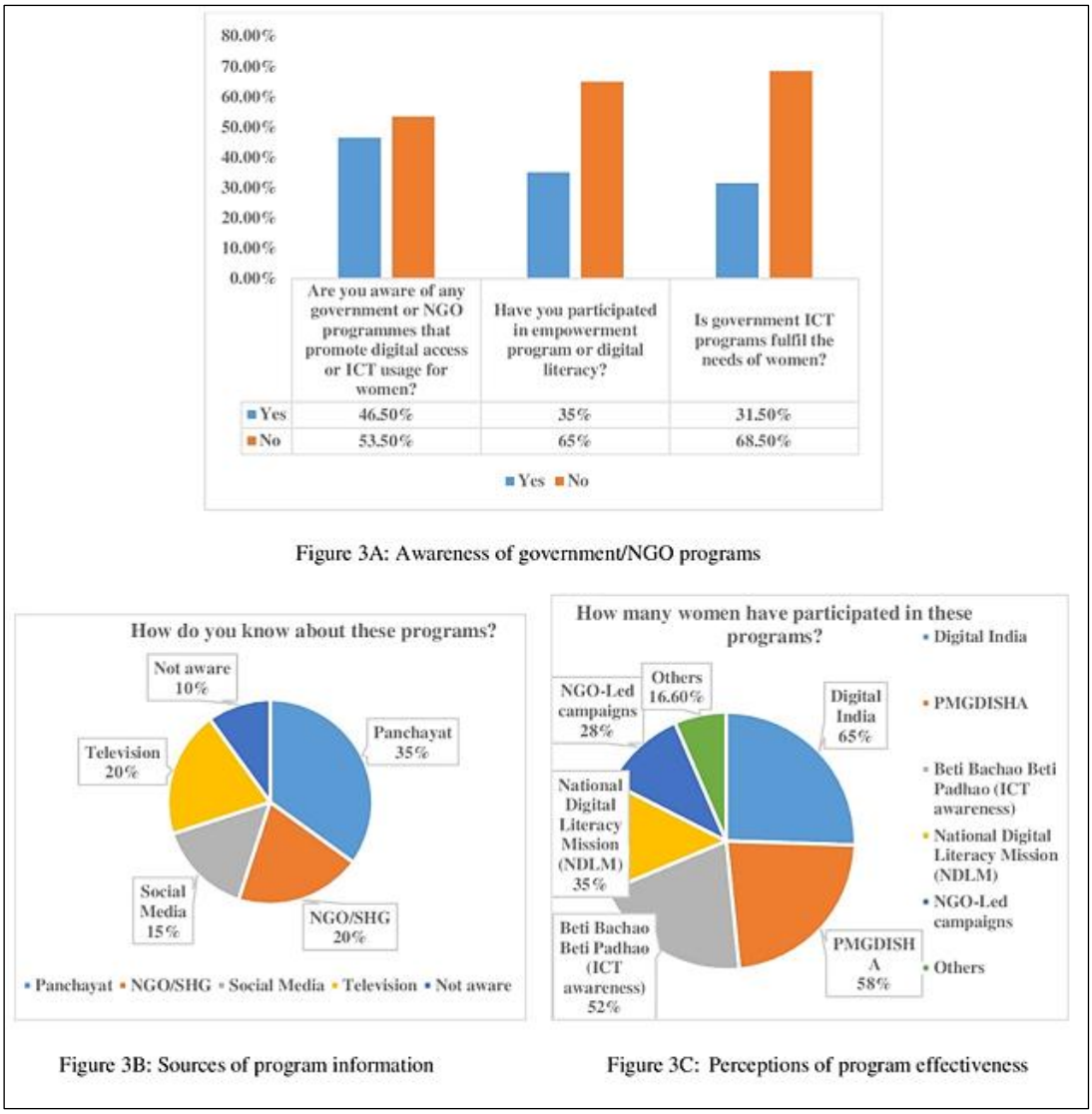

Figure 3: Awareness And Participation In ICT-Related Programs: (A) Awareness of Government/NGO Programs, (B) Sources of Program Information, (C) Perceptions of Program Effectiveness

Assessing the ICT usage in daily basis, it has been concluded that majority of women (45%) were involved in assessing ICT tools (mainly mobile phones, television or internet) for 1-2 hours per day, followed by 25% were involved in less than an hour. Interestingly, 15% reported usage in between 2-4 hours and 10% were involved in more than 4 hours daily. While, the remaining 5% of the respondents had no ICT usage. In context of household activities like food preparing receipes, educational content or agricultural tips, approximately 25% were frequently involved, 45% sometimes, 15% rarely and remaining 15% of the respondents never used ICT for this. However, it plays a vital role in educating the children's and about 70% of women reported that they were involved in online classes or educational videos for their children and remaining 30 % of the respondents did not involved in such activities. In terms of communication, 45 % of the respondents were frequently involved through the use of ICT followed by 35% sometimes, 14.5% rarely and remaining 5.5% were not involved in ICT usage for communication. These result findings showed that ICT integration into regular lives of rural women, especially in education and communication will promote digital familiarity and positive platform for women empowerment through ICT interventions. The data is represented in Figure 4A-C.

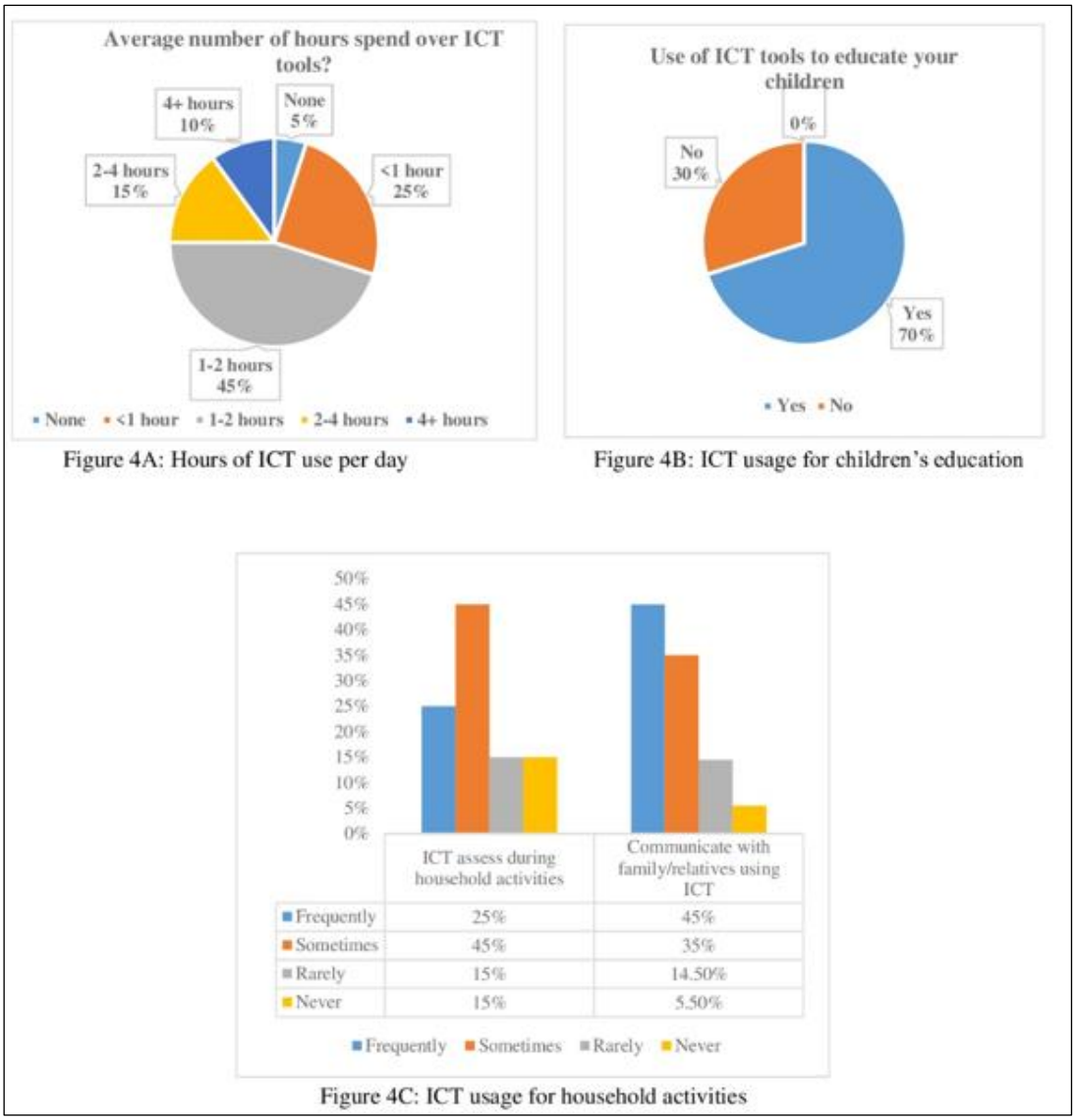

Figure 4: Daily ICT Usage: (A) Hours of ICT Use Per Day, (B) ICT Usage for Children's Education, (C) ICT Usage for Household Activities

The continuous usage of ICT for social media platforms such as Whatsapp, Facebook, Instagram for sharing information among the rural women. However, 68% of the respondents had access to social media platforms and among these, 65% were involved in social media updates or local news. This indicates that growing reliance on ICT provides information about community and regional affairs, enhancing civic engagement and awareness. However, during the assessment of social media platforms. 45.5 % of the respondents were involved in joining the online community group. This represents that usage of social media platforms influences rural women for collaborative opportunities and peer learning. The data is represented in Figure 5.

ICT plays a vital role in promoting the social sphere of rural women and which in turn, directly improves the quality of life. From the result findings, it has been documented that approximately 65% of the respondents displayed the improvement in their quality of life. However, in terms of market related information, approximately 40% of the respondents were involved in online shopping, crop prices and offers which indicates awareness and utility of digital platforms in economic activities. This in turn, opens the opportunities for rural women to get engaged in future opportunities like business, education and leadership roles. This survey-based study revealed that about 70% of the respondents were involved in future aspirations through assessing the ICT and thus, promoting women

empowerment. In terms of mobility, approximately 60% of the respondents expressed feeling for independency during the navigation from their villages through ICT tools like GPS navigation, transport apps and digital payment systems. This suggests a positive influence and self-reliance during public mobility. The data is represented in Figure 6.

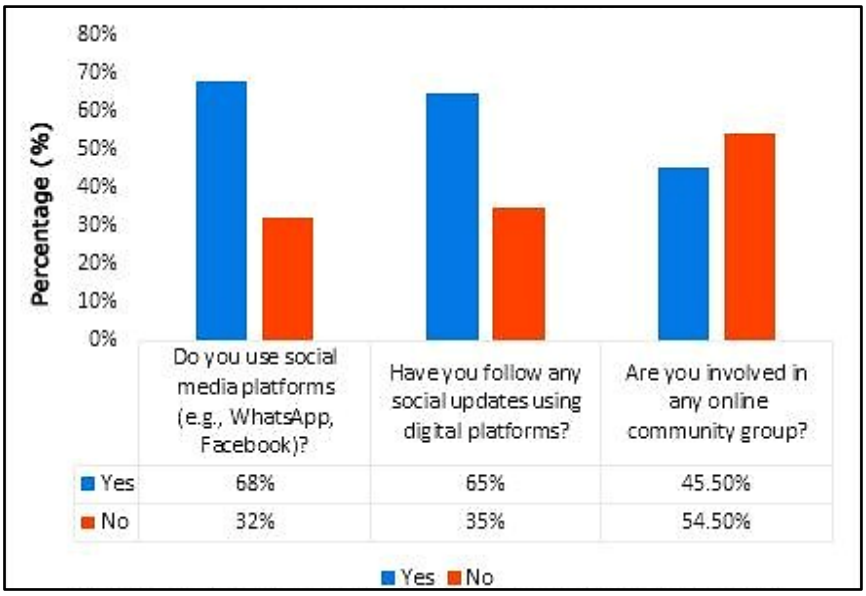

Figure 5: Involvement of Rural Women in ICT-Based Social Media Platforms: Usage of Whatsapp, Facebook, and Other Platforms for Community Updates, Local News, and Participation in Online Groups

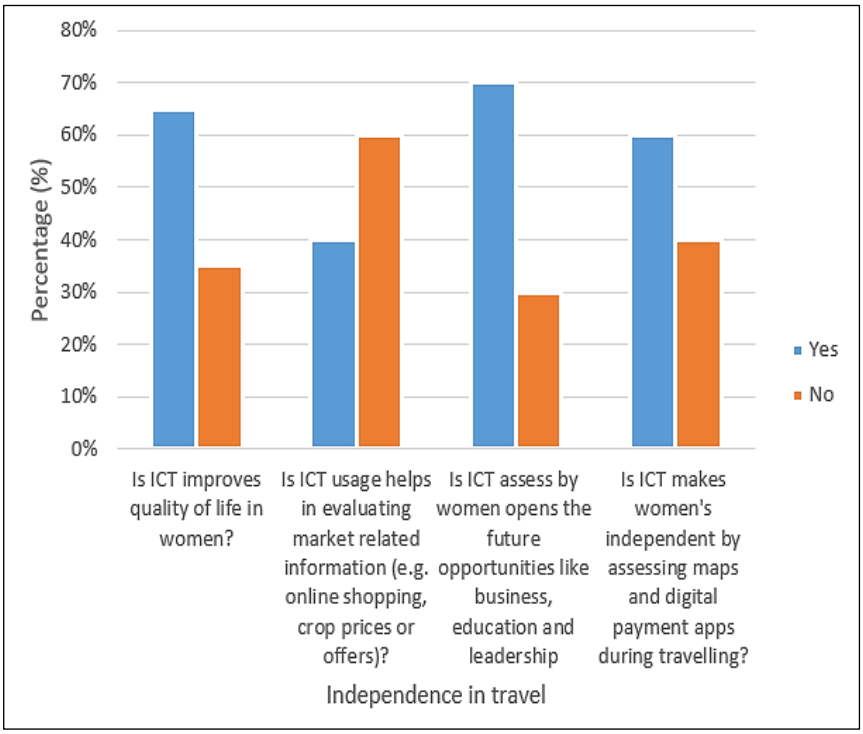

Figure 6: ICT Usage in Relation to Work, Perceptions, and Mobility: Independence in Traveling Outside the Village, Use of ICT for Market-Related Information, and Quality-Of-Life Improvements through Digital Tools

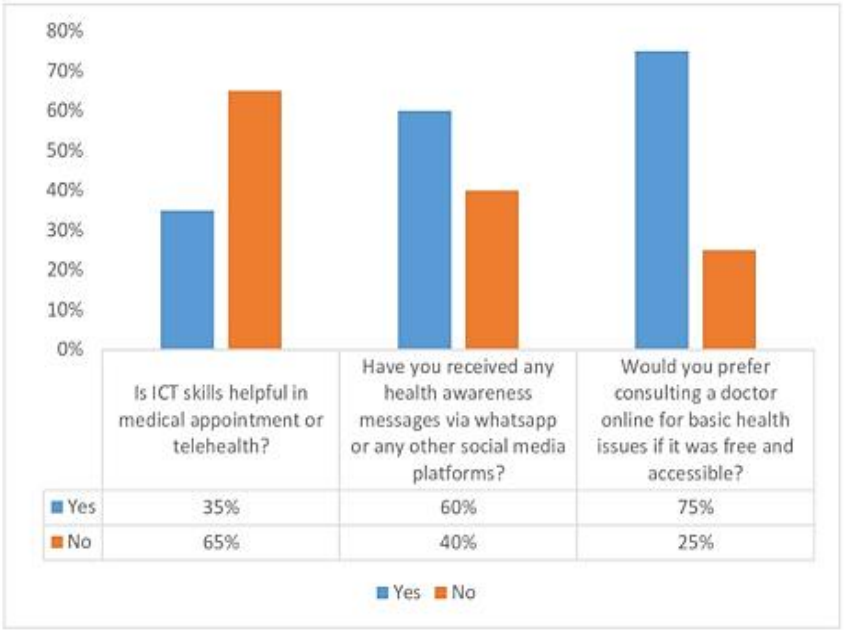

Figure 7A: Booking medical appointments or telehealth services

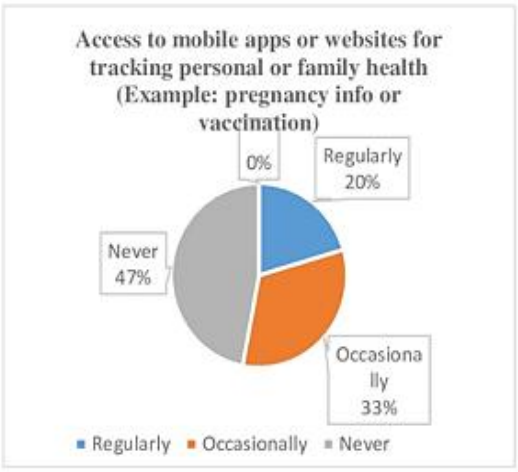

Figure 7B: Use of mobile apps or websites

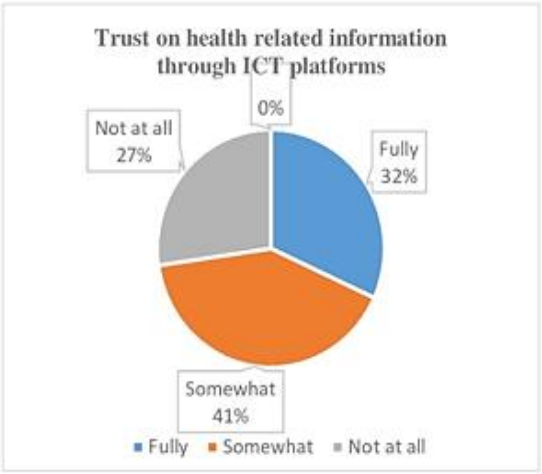

Figure 7C: Receiving health awareness messages and trust in digital health information

Figure 7: Use Of ICT Tools for Promoting Health and Well-Being: (A) Booking Medical Appointments or Telehealth Services, (B) Use of Mobile Apps or Websites for Family Health Tracking, (C) Receiving Health Awareness Messages and Trust n Digital Health Information

The assessment of utilization of ICT tools for health and well-being represented that approximately 35% of the respondents had booked a medical appointment or telehealth services using ICT tools. While, 20% of the respondents were using mobile apps or websites regularly for tracking personal or family health information (such as vaccination schedules or pregnancy care), with 35% were occasionally involved and remaining respondents were not involved. In terms of health awareness, about 60% of the respondents had received health related information through SMS or whatsapp and thus, showcasing the outreach for mobile based health communication. This in turn, increase the opportunities for online health consultations for medical issues. Among the 200 respondents, 75% were preferred online doctor consultations for medical issues. This indicated that online consultation prompted the trustworthiness in rural women. The result findings indicated that

32% of the respondents were fully dependent, 41% somewhat trusted it and remaining 27% did not trust on ICT tools (Figure 7A-C). These responses indicate a growing trend in adopting digital tools for healthcare support among rural women, though concerns about credibility and accessibility persist.

Among the rural women, reputation and awareness for women's rights or laws to protect women can be largely facilitated by ICT engagement. However, approximately 60% of the women were positively influenced for their rights and laws by using ICT tools, indicating the insightful awareness for digital exposure. In terms of reputation, the involvement of ICT tools had also influenced 65% of rural women for promoting their reputation in family and society. While, 45% of the respondents were strongly agreed or 35% agreed for equally training the rural women in ICT skills as men. The data is represented in Figure 8A and 8B.

Regarding digital safety and awareness, approximately 65% of the respondents were aware of digital safety practices like strong passwords and fraud alerts. While, 35% were totally unaware of these practices. The survey-based study revealed that about 68.5% of the respondents had experienced online frauds which indicates a significant vulnerability of users. However, 70% of the respondents had participated in digital safety session particularly designed for rural women, showing interest for learning and improvement. Among these, 40 % of the respondents were aware of reporting cybercrime or online threats. These findings indicated that awareness for digital safety practices and navigation for online risks protect users and build up the confidence in digital tool users. The data is represented in Figure 9.

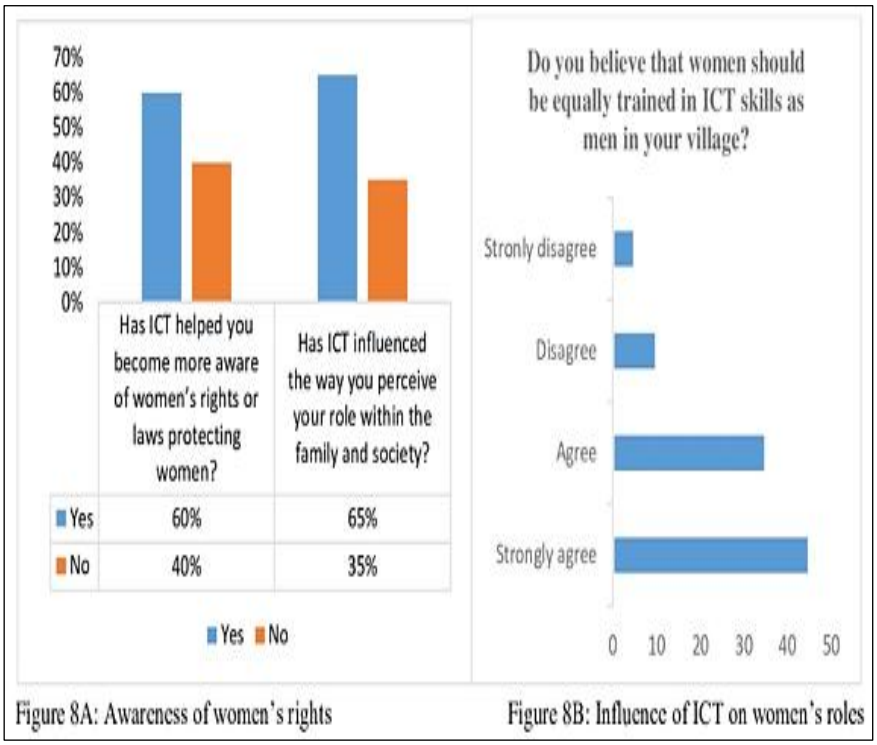

Figure 8: Gender Norms in ICT Usage: (A) Awareness of Women's Rights and Equal ICT Training Opportunities, (B) Influence of ICT on Women's Roles and Reputation within Family and Society

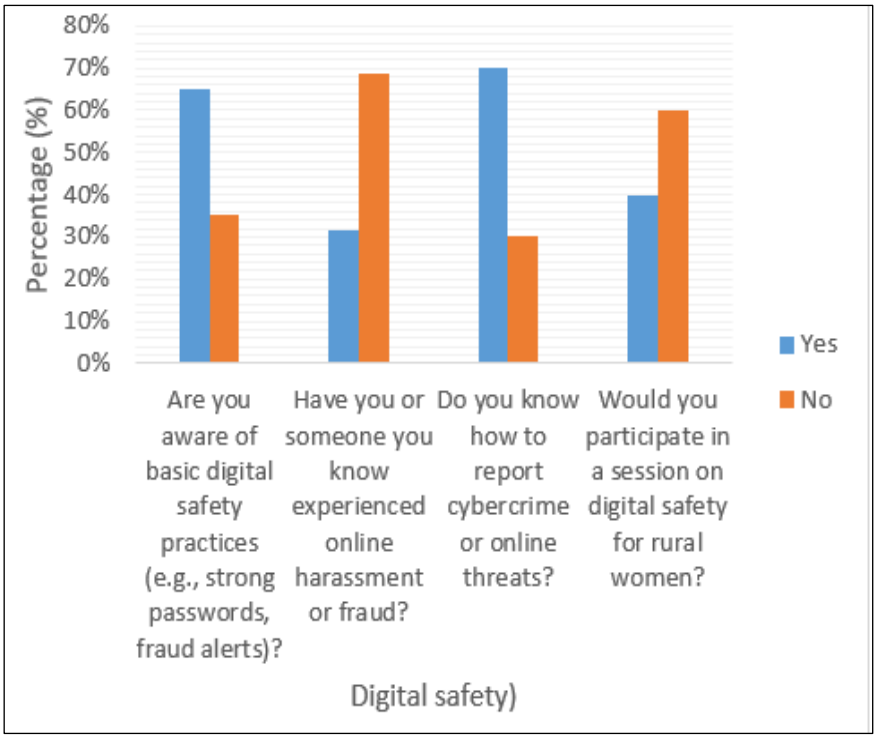

Figure 9: Digital Safety and Awareness for ICT Tools

Discussion

Understanding the demographic profile of rural women is essential for analyzing their access to, usage of, and perceptions of Information and Communication Technologies (ICT). Variables such as education, employment, income, family structure, and social background significantly impact women's ability to engage with digital tools and benefit from ICT-based programs. Among these, education stands out as a critical enabler of digital literacy. Women with secondary or higher education are more likely to use ICT tools effectively. A moderately educated population reflects potential for upskilling, especially through targeted training programs. However, the high proportion of women with little or no income highlights financial dependence, which may hinder access to digital devices and internet services. This points to the need for affordable ICT access tailored to their needs. Social factors such as caste and family type also influence digital engagement. A majority of respondents belonged to reserved categories and nuclear families groups often facing social vulnerability. These women stand to benefit greatly from inclusive digital initiatives led by governments or NGOs. Family structure also affects time availability and decision-making power, both of which influence ICT usage. The presence of children in the household can encourage ICT use for educational and health-related purposes. While, involvement in self-help groups (SHGs) indicates an existing support system that could be leveraged to scale digital literacy and empowerment. The demographic profile, therefore, not only reflects socio-economic realities but also reveals key areas where ICT interventions can be designed for greater impact (13).

In the context of socio-economic importance, the rural women further shapes their digital empowerment. Land ownership, participation in income-generating activities, access to bank accounts, and household decision-making roles are strong indicators of financial independence and agency. Women with land or property and access to personal or family bank accounts are more likely to control resources and benefit from ICT for economic advancement. The participation in self-help groups enhances social capital and can be harnessed for digital entrepreneurship. Furthermore, women involved in decision-making and those receiving government subsidies tend to play active roles in household and community life. These socio-economic markers strongly influence women's readiness and capacity to adopt ICT for livelihoods, education, health, and civic participation. To understanding these factors, it is necessary to design inclusive and relevant ICT-

based policies and interventions. As, awareness and policy engagement plays a critical role in helping rural women for digital empowerment. However, digital literacy programs and the channels through which women receive information highlight the effectiveness of outreach strategies. Moreover, evaluating their understanding and perceptions of these programs helps policymakers and NGOs tailor more relevant, inclusive, and accessible interventions (14).

The integration of ICT into daily routines offers notable benefits for personal empowerment, household management, and socio-economic development. Digital tools like mobile phones, televisions, and the internet help rural women access real-time information on health, agriculture, education, and household tasks. This enhances decision-making and multitasking abilities, such as using cooking apps, monitoring children's education, or listening to agricultural updates during chores. These practices build digital familiarity and confidence, especially among women with limited education or mobility, turning ICT into a daily necessity rather than a luxury. Socially, ICT strengthens communication and community bonds. Platforms such as social media and online groups enable women to express opinions, seek assistance, and engage in civic discourse—activities often restricted in traditional settings. ICT breaks geographic barriers, helping women connect beyond their villages. This reduces isolation, builds confidence, and encourages collective action in areas like health, education, entrepreneurship, and rights awareness (15).

ICT also plays a transformative role in work, perception, and mobility. Access to market information via digital tools improves economic decision-making and creates income opportunities. Women's use of ICT to navigate spaces outside their homes reflects increased independence and public participation. Perceptions of improved quality of life through ICT suggest that digital inclusion fosters both practical benefits and psychological empowerment. Aspirations to use ICT for future education, entrepreneurship, or leadership show a growing sense of self-efficacy among rural women. In the health domain, ICT bridges gaps between remote communities and healthcare systems, especially where infrastructure is lacking. Health information delivered via digital platforms promotes preventive care and better health-seeking behavior. Trust in telehealth and mobile health content reveals a readiness to adopt digital health services. Integrating ICT into rural health systems can lead to healthier, more informed communities (16, 17).

Understanding gender norms in ICT usage highlights both the challenges and opportunities in digital empowerment. ICT can disrupt traditional gender roles by offering access to information, new perspectives, and networks that promote agency. Greater awareness of rights and support for equal ICT training reflect a cultural shift toward gender equity. As more women engage with digital platforms, they gain skills and confidence to participate in family and community decision-making, driving inclusive development and challenging entrenched biases. Finally, digital safety is a critical aspect of ICT empowerment, especially for first-time or limited-literacy users (18).

The findings demonstrate that ICT has become an important enabler of women's empowerment in Kanpur, particularly in education, income generation, mobility, and health awareness. Several enabling factors stand out. Access to Community Media Centres (CMCs) and Self-Help Groups (SHGs) created structured pathways for women to acquire computer literacy, participate in online markets, and build confidence in financial management. The widespread use of mobile phones and social media platforms fostered new forms of communication and community engagement. Similar results were reported in Kerala, where mobile technology significantly enhanced women farmers' access to agricultural information, strengthened market participation, and increased social connectivity, although limited digital literacy and infrastructure remained persistent barriers (19).

At the same time, multiple restricting factors continue to limit ICT adoption. Financial barriers prevented women from purchasing personal devices or sustaining internet subscriptions. Social hierarchies—particularly caste and class—shaped who could access training programs, with marginalized women often excluded or facing additional challenges. Educational disparities also had a strong effect: women with higher secondary education or above were far more confident in using ICT, whereas those with minimal schooling

were dependent on intermediaries. Generational gaps further restricted older women's engagement with ICT, while younger women showed greater adaptability and confidence in adopting digital tools. These patterns are consistent with regional evidence showing that women in South Asia are approximately 31% less likely than men to access mobile internet, with significant implications for health and nutrition outcomes (20).

A comparative perspective with rural South Asia reveals similar dynamics. In Bangladesh, mobile-based health and awareness campaigns improved maternal care engagement but excluded women without personal phone ownership. Sri Lankan and Nepalese studies confirm that ICT-based empowerment is closely linked to affordability, literacy, and supportive social networks. Comparable evidence from India also highlights that rural women entrepreneurs face socio-cultural constraints, lack of device ownership, and connectivity costs as major impediments, despite recognizing the strong benefits of ICT for livelihoods. These findings suggest that the Kanpur study reflects a wider South Asian trend: ICT adoption can enhance agency but is mediated by persistent socio-economic divides.

The results also gain depth when contrasted with the experiences of semi-urban and metropolitan women in India. Urban women typically enjoy higher baseline literacy, easier smartphone access, and greater integration of ICT in entrepreneurial ventures and professional life. A recent comparative study showed that urban women use ICT for business, networking, and professional development, while rural women, when given access, derive more immediate benefits in areas like health awareness, household decision-making, and participation in government programs (21). This contrast underscores the need for context-specific strategies: while urban interventions focus on scaling entrepreneurial ICT use, rural programs must emphasize digital literacy, affordability, and culturally sensitive outreach.

Overall, the discussion illustrates that ICT empowerment in Kanpur is a multi-layered process, shaped by enabling infrastructure (CMCs, SHGs, mobile phones), restrictive barriers (poverty, caste, education gaps), and socio-cultural dynamics. By situating these findings in both regional and national contexts, the study contributes to a deeper understanding of how ICT transforms women's lives in diverse environments. The evidence aligns with recent scholarship emphasizing that ICT is not merely a technological tool but a socially embedded process, one that must address inequality and gendered power relations to deliver meaningful empowerment (19-21).

Conclusion

This study demonstrates that ICT has become a vital driver of empowerment for rural women in Kanpur by improving access to education, livelihood opportunities, health services, mobility, and household decision-making. Several enabling factors were identified, such as the presence of Community Media Centres (CMCs), participation in Self-Help Groups (SHGs), and the increasing use of mobile platforms, which collectively enhanced women's digital literacy and confidence. At the same time, restricting factors—including limited financial resources, lack of device ownership, socio-cultural restrictions, and caste-based exclusion—continue to hinder equal participation in the digital economy.

The results are highly relevant for ongoing government initiatives such as *Digital India*, *Mahila E-Haat*, and the *National Rural Livelihood Mission (NRLM)*, which aim to improve digital inclusion and women's empowerment. However, the study highlights that the full potential of these programs can only be realized if targeted measures address affordability, accessibility, and cultural sensitivity at the grassroots level.

From a theoretical perspective, the findings reinforce that ICT becomes empowering when it enhances women's real capabilities and freedoms, while also challenging gendered barriers to participation. The evidence shows that even basic ICT skills, such as digital payments, online communication, or access to health information, can produce transformative effects in rural households.

In conclusion, ICT should not be seen only as a technological intervention but as part of a broader social and developmental process. Bridging the digital divide requires integrated strategies that combine infrastructure development, affordable access, and gender-sensitive training. Future research should extend this study through cross-district and cross-state comparisons to identify scalable models that maximize empowerment

outcomes. With such efforts, ICT can truly act as a catalyst for inclusive rural development and sustainable social transformation.

Abbreviations

AI: Artificial Intelligence, CMC: Community Media Centre, GAD: Gender and Development, ICT: Information and Communication Technology, NRLM: National Rural Livelihood Mission, SHG: Self-Help Group.

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Author Contributions

The authors confirm sole responsibility for the study conception, design, data collection, analysis, interpretation of results, and manuscript preparation.

Conflict of Interest

The author declares no conflict of interest regarding the publication of this study.

Declaration of Artificial Intelligence (AI) Assistance

Artificial Intelligence (AI)-assisted tools were used solely for grammar correction, language refinement, and formatting of references. All research design, data collection, analysis, and interpretation were carried out by the author.

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Appendix

S.No.	Study characteristics	Questionnaires	Options
1)	Demographic Information	Education Level	☐ No formal education ☐ Primary education ☐ Secondary education ☐ Higher secondary ☐ Diploma/Undergraduate ☐ Postgraduate and above
		What is your recent employment status?	☐ Unemployed ☐ Self-employed ☐ Daily wage laborer ☐ Salaried (government/private) ☐ Homemaker ☐ Student ☐ Other
		Monthly Income	☐ No income ☐ Less than ₹10,000 ☐ ₹10,000 – ₹20,000 ☐ ₹20,000 – ₹40,000 ☐ More than ₹40,000
		Do you belong to any reserved category?	☐ Yes ☐ No
		Type of family	☐ Nuclear☐ Joint☐ Extended
		Number of children	☐ None☐ 1☐ 2☐ 3 or more
2)	Socio-Economic Condition	Do you have your own land or property?	☐ Yes☐ No
		Are you involved in income-generating activities?	☐ Yes☐ No
		Do you have access to personal or family bank accounts?	☐ Yes☐ No
		Are you a member of any Self-Help Group (SHG)?	☐ Yes☐ No
		Are you the primary decision-maker in household matters?	☐ Always☐ Sometimes☐ Never
		Do you receive any government subsidies or welfare schemes?	☐ Yes☐ No

		Do you face financial constraints in accessing education or training?	☐ Yes☐ No
		What is your main source of livelihood?	☐ Agriculture☐ Livestock☐ Daily wage labor☐ Small business☐ Government/private job ☐ Other
3)	Awareness and Policy Engagement	Are you aware of any government or NGO programmes that promote digital access or ICT usage for women?	☐ Yes ☐ No
		Have you ever been part of a digital literacy or empowerment program for women?	☐ Yes ☐ No
		If yes, which of the following have you heard of or participated in?	☐ Digital India ☐ PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan) ☐ Beti Bachao Beti Padhao (ICT awareness part) ☐ National Digital Literacy Mission (NDLM) ☐ NGO-led digital literacy campaigns ☐ Other (please specify): _____
		How do you receive information about such programs?	☐ Panchayat ☐ SHG/NGO ☐ Social Media ☐ Television ☐ Not aware
		Do you feel government ICT programs meet the needs of rural women?	☐ Yes ☐ No ☐ Not sure
4)	Daily Routine and ICT Usage	How many hours do you spend on ICT tools (mobile, TV, internet, etc.) daily?	☐ None ☐ <1 hour ☐ 1–2 hours ☐ 2–4 hours ☐ 4+ hours
		Do you use ICT during your household work (e.g., for recipes, farming tips, education)?	☐ Frequently ☐ Sometimes ☐ Rarely ☐ Never
		Do you use ICT tools to support your children's education (e.g., online classes, educational videos)?	☐ Yes ☐ No

		Do you communicate with family or relatives living elsewhere using ICT (e.g., phone calls, WhatsApp)?	☐ Frequently ☐ Occasionally ☐ Rarely ☐ Never
5)	Social interaction and ICT	Do you use social media platforms (e.g., WhatsApp, Facebook)?	☐ Yes ☐ No
		Do you follow any local news or social updates using digital platforms?	☐ Yes ☐ No
		Have you participated in any online community group (e.g., SHG, farming group, women's network)?	☐ Yes ☐ No
6)	Work, Mobility, and ICT Perceptions and Aspirations	Do you use ICT for market-related information (e.g., crop prices, online selling, offers)?	☐ Yes ☐ No
		Do you feel more independent in traveling or navigating outside your village using ICT (e.g., maps, digital payment apps)?	☐ Yes ☐ No
		Do you believe ICT has improved your quality of life?	☐ Significantly ☐ Slightly ☐ No change ☐ Decline
		Do you aspire to use ICT for future opportunities (e.g., business, education, leadership)?	☐ Yes ☐ No
7)	Health and Well-being	Have you ever booked a medical appointment or accessed telehealth using ICT (phone/internet)?	☐ Yes ☐ No
		Do you use mobile apps or websites to track personal or family health (e.g., vaccination, pregnancy info)?	☐ Regularly ☐ Occasionally ☐ Never
		Have you received any health awareness messages through SMS or WhatsApp?	☐ Yes ☐ No
		Do you trust health information received via ICT platforms?	☐ Fully ☐ Somewhat ☐ Not at all
		Would you prefer consulting a doctor online for basic health issues if it was free and accessible?	☐ Yes ☐ No ☐ Maybe
8)	Gender Norms	Has ICT helped you become more aware of women's rights or laws protecting women?	☐ Yes ☐ No

		Do you believe that women should be equally trained in ICT skills as men in your village?	☐ Strongly agree ☐ Agree ☐ Disagree ☐ Strongly disagree
		Has ICT influenced the way you perceive your role within the family and society?	☐ Yes ☐ No
9)	Digital Safety and Awareness	Are you aware of basic digital safety practices (e.g., strong passwords, fraud alerts)?	☐ Yes ☐ No
		Have you or someone you know experienced online harassment or fraud?	☐ Yes ☐ No
		Do you know how to report cybercrime or online threats?	☐ Yes ☐ No
		Would you participate in a session on digital safety for rural women?	☐ Yes ☐ No