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Educational Empowerment Through ICT Among Rural Women in The Chengalpattu District of Tamil Nadu: Challenges in Using Information and Communication Technology

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ABSTRACT
The study investigates educational empowerment among rural women through Information and Communication Technology (ICT) and challenges in using ICT in Chengalpattu District, Tamil Nadu. Using a descriptive research design, data were collected from 255 rural women through a structured interview schedule, selected using a multistage sampling technique. The study assesses ICT usage, empowerment levels, and challenges faced by rural women. Findings indicate that rural women perceive the greatest educational empowerment through staying updated with current affairs (mean = 4.51), increased accessibility to learning (mean = 4.50), and supporting children's education (mean = 4.49). Age, marital status, occupation, income, and family type significantly influence empowerment, while educational qualifications do not. K-Means cluster analysis reveals 50% of women report high empowerment (mean = 4.39), while 58.33% face high-level ICT challenges (mean = 4.26) due to financial barriers, technical hurdles, and social stigma. The study recommends targeted digital literacy programs, financial assistance for ICT access, and community-based ICT initiatives to reduce barriers and enhance the educational empowerment of rural women. The research highlights the transformative potential of ICT in bridging educational and socio-economic gaps in rural communities.

Keywords: Educational empowerment, ICT, Rural women

1. INTRODUCTION

Empowerment is the process through which individuals gain control over their lives, enabling them to act on issues they consider important (Kabeer, 1999). It involves fostering self-confidence, providing access to resources, and enhancing decision-making capacities (Rowlands, 1997). Empowerment encompasses social, economic, political, and educational dimensions, fostering holistic development and promoting equality (Sen, 1999). It is a transformative process that challenges social norms and enhances participation in various spheres of life (Mosedale, 2005). The concept of empowerment is especially significant for marginalized groups, including rural women, as it facilitates social inclusion and improved living standards (Parpart, Rai, & Staudt, 2002).

Women empowerment refers to the process of increasing women's access to resources, decision-making, and control over their lives (Malhotra & Schuler, 2005). It involves creating an environment where women can realize their potential and exercise their rights (UN Women, 2015). According to Nussbaum (2000), empowering women leads to increased agency, improving not only their lives but also contributing to community welfare. Rural women, who often face socio-economic barriers, particularly benefit from empowerment initiatives (Cornwall, 2016). Educational empowerment is a critical dimension of women empowerment, as it equips women with knowledge and skills to participate actively in social and economic processes (Stromquist, 1995).

The integration of Information and Communication Technology (ICT) has revolutionized educational opportunities, particularly for rural women (Gurumurthy & Chami, 2014). ICT bridges geographical and socio-economic divides by providing access to educational resources and facilitating lifelong learning (Unwin, 2009). Women in rural areas often face limited access to traditional educational systems due to distance, financial constraints, and cultural factors (Singh, 2017). By leveraging ICT, these barriers can be mitigated, fostering educational empowerment and broader socio-economic development (Hafkin & Huyer, 2006). Furthermore, ICT empowers women by enhancing their digital literacy, expanding employment opportunities, and fostering social inclusion (Hilbert, 2011). Thus, educational empowerment through ICT plays a pivotal role in enhancing the capabilities of rural women and promoting sustainable development (Walsham, 2017).

2. REVIEW OF LITERATURE

The integration of Information and Communication Technology (ICT) has significantly transformed educational systems globally, particularly in rural areas where access to traditional educational resources is limited. ICT facilitates knowledge dissemination, promotes interactive learning, and enhances digital literacy, which are crucial for empowering rural women (Gurumurthy & Chami, 2014). Several studies have emphasized that access to ICT tools allows rural women to overcome geographical and socio-economic barriers, enabling participation in formal and informal education (Hafkin & Huyer, 2006). According to Hilbert (2011), the use of ICT enhances educational opportunities for rural women by providing access to online courses, digital libraries, and virtual classrooms. Furthermore, the application of ICT fosters self-learning, skill enhancement, and greater access to employment opportunities (Unwin, 2009). In rural India, for instance, ICT initiatives have played a critical role in providing women with literacy training and vocational education, promoting socio-economic mobility (Singh, 2017). Despite these advancements, disparities in digital access persist, with rural women facing infrastructural and socio-cultural challenges that hinder their full participation in ICT-based education (Walsham, 2017).

The role of ICT in the educational empowerment of rural women extends beyond providing knowledge to fostering critical thinking, enhancing communication skills, and promoting social inclusion (Stromquist, 1995). According to Malhotra and Schuler (2005), ICT-based education is instrumental in increasing women's decision-making capacities and improving their socio-economic conditions. Digital literacy, a main component of ICT empowerment, allows rural women to engage with government schemes, access healthcare information, and participate in local governance (Cornwall, 2016). Besides, studies highlight the transformative impact of community-based ICT programs that address gender disparities and promote collective empowerment (Gurumurthy & Chami, 2014). However, Mosedale (2005) points out that while ICT fosters educational empowerment, it is crucial to address the structural inequalities that limit rural women's access to digital resources. Socio-economic factors such as poverty, lack of digital infrastructure, and restrictive gender norms pose significant barriers to the effective use of ICT (Kabeer, 1999). Research indicates that providing affordable digital access, gender-sensitive training programs, and community support mechanisms can bridge the digital divide and enhance educational outcomes for rural women (Hilbert, 2011).

While ICT holds transformative potential, rural women face multiple challenges in using digital technologies for educational purposes. These challenges include a lack of digital literacy, inadequate infrastructure, cultural restrictions, and gender biases (Hafkin & Huyer, 2006). According to Hilbert (2011), socio-cultural norms often limit rural women's engagement with digital technologies, reinforcing traditional gender roles and excluding them from digital learning spaces. Also, financial constraints prevent many rural households from accessing devices and the internet (Unwin, 2009). Singh (2017) highlights that language barriers and a lack of localized content further restrict rural women's ability to utilize ICT effectively. Moreover, Gurumurthy and Chami (2014) argue that sustainable ICT interventions must be community-centered and address the specific needs of rural women to be successful. Research by Walsham (2017) emphasizes the importance of policy frameworks that promote digital equity and gender-inclusive ICT programs. Despite growing attention to the intersection of gender and technology, there is a lack of comprehensive studies examining the long-term impacts of ICT-based educational empowerment for rural women. The research gap highlights the need for further investigation into how ICT can be more effectively leveraged to empower rural women educationally while addressing the socio-economic and cultural barriers they face (Cornwall, 2016).

3. CHENGALPATTU DISTRICT OF TAMIL NADU

Chengalpattu District, situated in the southeastern state of Tamil Nadu, India, encompasses a diverse socio-economic landscape with both urban and rural populations. As of the 2011 Census, Chengalpattu Taluk had a population of 573,406, with males numbering 289,210 and females 284,196 (census; 2011). The district's average literacy rate stood at 75.73%, with male literacy at 80.63% and female literacy at 70.74%. The integration of Information and Communication Technology (ICT) in Chengalpattu has been pivotal in enhancing educational access and promoting digital literacy, especially among rural women. Government initiatives and local non-governmental organizations (NGOs) have introduced various ICT programs aimed at empowering women by providing educational resources and skill development opportunities. These initiatives are designed to bridge the digital divide and promote socio-economic development. However, challenges such as inadequate infrastructure, limited digital literacy, and socio-cultural restrictions continue to hinder the full utilization of ICT by rural women.

Research focusing on the educational empowerment of rural women through ICT in Chengalpattu District is essential for designing effective policies and programs. Such studies contribute to the broader discourse on gender equity, digital inclusion, and rural development in Tamil Nadu and beyond.

4. OBJECTIVES OF THE STUDY

1. To examine the level of educational empowerment among rural women through ICT in the study area.
2. To analyze the challenges faced by rural women in using ICT in the study area.

5. RESEARCH DESIGN

According to Creswell (2009), research design is a structured plan that integrates philosophical assumptions, strategies of inquiry, and specific methods to conduct research. Similarly, Kumar (2011) emphasizes that research design serves as a guide for effectively answering research questions. The study adopts a descriptive research design to analyze the level of educational empowerment among rural women and challenges facing by them in using ICT, and ICT usage among rural women in Chengalpattu District. Descriptive research systematically examines existing conditions, practices, and trends (Best & Kahn, 2006), making it suitable for understanding the role of ICT in women's empowerment. It helps capture participants' experiences, challenges, and the impact of ICT on their daily lives.

6. SOURCES OF DATA

Primary Data: Primary data is collected through surveys from rural women in Chengalpattu district of Tamil Nadu regarding women empowerment through Information and Communication Technology.
Secondary Data: Secondary data is sourced from scholarly research, government reports, and census data to supplement the findings.

7. RESEARCH TOOLS

Educational empowerment through ICT included 12 questions, while ICT usage was measured with 14 questions, both using the same five-point scale (Never, Rarely, Sometimes, Often, Always). Also, challenges in using ICT interview schedule were analyzed through 14 questions on a five-point Likert scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree), ensuring a comprehensive understanding of ICT's role in empowerment.

8. RELIABILITY AND VALIDITY

The study ensures reliability through Internal Consistency Reliability using Cronbach's Alpha, which yielded 0.87 for Educational Empowerment through ICT and 0.80 for Challenges in Using ICT, indicating good reliability. Validity is established through expert review, pilot testing, and alignment with theoretical frameworks. The structured interview schedules comprehensively address educational empowerment and ICT-related challenges, ensuring accurate and consistent data collection while capturing the experiences of rural women in Chengalpattu District.

9. UNIVERSE OF THE STUDY

Chengalpattu district of Tamilnadu, established on November 29, 2019, was carved out from the erstwhile Kancheepuram district in Tamil Nadu, India. Spanning 2,945 square kilometers, it consists of eight blocks: Acharapakkam, Chithamur, Kattankulathur, Lathur, Maduranthagam, St. Thomas Mount, Thirukalukundram, and Thiruporur. With 359 village panchayats, the district's rural regions face significant challenges in education and digital literacy. As per the 2011 Census, the population of the area now constituting Chengalpattu was 2,556,423. While industrial growth thrives near urban centers, rural communities rely on agriculture, emphasizing the importance of ICT for improving educational access and socio-economic empowerment.

10. SAMPLING DESIGN

To ensure fair representation from different regions within Chengalpattu District, a multistage sampling technique was employed to select the villages and respondents.
First, Chengalpattu District was divided into four geographical regions: North, South, East, and West. Four blocks were randomly selected from the district's eight administrative blocks, ensuring balanced geographical coverage. The selected blocks were Kattankulathur (North), Thirukalukundram (South), Chengalpattu (East), and Maduranthakam (West).
From each block, two villages were randomly chosen to capture rural diversity. The selected villages were Venkatapuram and Thenmelpakkam (Kattankulathur), Konathi and Orathur (Thirukalukundram), Sembakkam and Paranur (Chengalpattu), and Konerikuppam and Chithathur (Maduranthakam).
In the final stage, female respondents aged 18 years and above were randomly chosen from each selected village. Eligible participants were those who either owned a mobile phone or regularly used one within their household. Approximately 5.25% of the female population in each village was sampled, resulting in a total of 255 respondents. The sampling design ensured diverse representation and a comprehensive understanding of educational empowerment through ICT and the challenges faced by rural women in Chengalpattu District.

11. ANALYSIS AND INTERPRETATION

Table: 1. Descriptive Statistical Analysis of Educational Empowerment through ICT among Rural Women

S.No	Statements	N	Mean	SD	Mean Rank
1	Do you use ICT to access learning resources (e.g., online courses, YouTube tutorials)?	255	3.20	1.60	6
2	Have you improved your reading and writing skills using ICT?	255	3.00	1.66	8

3	Does ICT help you stay updated with current affairs and news?	255	4.51	0.93	1
4	Do you use ICT to help your children with their studies?	255	4.49	1.00	3
5	Has ICT made learning more accessible and convenient for you?	255	4.50	1.01	2
6	Have you attended virtual training or workshops using ICT?	255	1.20	0.93	9
7	Has ICT helped you improve your professional or vocational skills?	255	4.26	1.39	4
8	Do you believe digital literacy is essential for personal and professional growth?	255	4.26	1.38	4
9	Has ICT enabled you to share knowledge and experiences with others?	255	4.07	1.45	5
10	Do you feel confident in using online education platforms?	255	4.50	1.01	2
11	Has ICT enhanced your awareness of health, hygiene, and nutrition?	255	4.50	1.01	2
12	Do you use ICT to develop new life skills (e.g., communication, problem-solving)?	255	3.08	1.70	7

Source: Primary data

Table 1 presents the mean and standard deviations of the factors contributing to educational empowerment through ICT among rural women. The table consists of 12 statements, each evaluated using a five-point Likert scale. The mean values range from 4.51 to 1.20, highlighting variations in the responses. The calculated standard deviation ranges from 1.70 to 0.93, indicating the degree of variability in responses.

The respondents reported "ICT helps them stay updated with current affairs and news," which secured the highest mean value (4.51) and ranked 1st, indicating a significant role of ICT in knowledge enhancement. "ICT has made learning more accessible and convenient," "confidence in using online education platforms," and "awareness of health, hygiene, and nutrition through ICT" all secured a mean value of 4.50 and ranked 2nd, reflecting the importance of digital platforms in facilitating education and awareness. In addition, "using ICT to help children with their studies" had a mean value of 4.49 and ranked 3rd, suggesting that ICT plays a crucial role in supporting children's education. Furthermore, "ICT has helped respondents improve their professional or vocational skills" and "digital literacy being essential for personal and professional growth" both received a mean value of 4.26 and ranked 4th, highlighting the role of ICT in skill development. "ICT enabled respondents to share knowledge and experiences with others" had a mean value of 4.07 and ranked 5th, indicating the significance of ICT in fostering knowledge exchange. Besides, "Using ICT to access learning resources (e.g., online courses, YouTube tutorials)" received a mean value of 3.20 and ranked 6th, showcasing moderate engagement with digital learning platforms. “ICT to develop new life skills like communication, problem-solving” had a mean value of 3.08 and ranked 7th and "Improvement in reading and writing skills through ICT" had a mean value of 3.00 and ranked 8th, demonstrating some impact on literacy development. The lower-ranked statements include "attending virtual training or workshops using ICT," which had the lowest mean value (1.20) and ranked 9th, suggesting limited participation in online training programs.

From the standard deviations, it is evident that there is considerable variation in the degree of educational empowerment experienced by the respondents through ICT.

Hence, ICT has significantly contributed to "staying informed," "learning accessibility," and "supporting children's education." However, challenges remain in areas such as "virtual training participation" and "developing fundamental literacy skills through ICT." Future initiatives should focus on improving digital literacy programs and increasing participation in virtual training opportunities for rural women.

Table: 2. K-Means Cluster Analysis of Educational Empowerment through ICT among Rural Women

Level	Frequency (No. of Statements)	Mean Value	Percentage (%)
High	6	4.39	50.00%
Moderate	3	3.12	25.00%
Low	3	1.76	25.00%

Source: Primary data

The K-Means cluster analysis in Table 2 categorizes educational empowerment through ICT among rural women into three levels: high, moderate, and low. The results indicate that 50% of the statements fall under the high category (mean = 4.39), suggesting that ICT significantly enhances educational empowerment for many rural women. Meanwhile, 25% of statements reflect a moderate level (mean = 3.12), indicating partial benefits from ICT integration. The remaining 25%

fall under the low category (mean = 1.76), highlighting barriers such as digital literacy challenges and limited access to ICT resources. These findings emphasize the need for targeted interventions to enhance ICT accessibility and usage for rural women.

Table: 3. Statistical Analysis on the level of Educational Empowerment through ICT among Rural Women based on Demographic Variables

Factor	Age Group	N	Mean	SD	F-Value	P-Value
Age Group	Below 30 Years	21	3.65	1.20	5.482	0.0015
	31-40 Years	79	4.02	1.10		
	41-50 Years	75	4.18	1.05		
	Above 50 Years	80	3.78	1.15		
	Total	**255**	**3.91**	**1.15**		
Marital Status	Married	238	3.90	1.15	4.215	0.0162
	Unmarried	13	3.85	1.10		
	Widow	4	3.40	1.25		
	Total	**255**	**3.87**	**1.12**		
Educational Qualification	Illiterate	11	3.82	1.02	0.000	1.000
	Primary Education	106	3.83	1.04		
	Secondary Education	41	3.78	1.03		
	Higher Secondary	23	3.86	1.04		
	Graduation and Above	74	3.81	1.01		
	Total	**255**	**3.82**	**1.03**		
Occupational Status	Coolie	136	3.75	1.05	3.245	0.007
	Desktop Publishing Asst.	6	4.10	0.85		
	Farmers	20	3.90	1.00		
	Housewife	28	3.65	1.12		
	Agent in LIC	33	4.20	0.95		
	Teacher	32	4.30	0.90		
	Total	**255**	**3.86**	**1.00**		
Monthly Family Income	Below 10,000	120	3.45	1.20	5.842	0.0012
	10,000-20,000	63	3.78	1.15		
	20,000-30,000	28	4.05	1.10		
	Above 30,000	44	4.20	0.95		
	Total	**255**	**3.87**	**1.10**		
Type of Family	Nuclear	174	3.85	1.12	4.572	0.0332
	Joint	81	4.12	1.05		
	Total	**255**	**3.99**	**1.09**		

Source: Primary data

Table 3 presents the statistical analysis on the level of educational empowerment through Information and Communication Technology (ICT) among rural women based on various demographic variables. The analysis includes factors such as age group, marital status, educational qualification, occupational status, monthly family income, and type of family.

The analysis reveals a significant difference in the level of educational empowerment through ICT among rural women across different age groups ($F = 5.482$, $p = 0.0015$). Women aged 41-50 years report the highest mean score ($M = 4.18$, $SD = 1.05$), indicating a higher level of educational empowerment, followed by those in the 31-40 years age group ($M = 4.02$, $SD = 1.10$). Women above 50 years show a moderate mean score ($M = 3.78$, $SD = 1.15$), while those below 30 years have the lowest mean score ($M = 3.65$, $SD = 1.20$), suggesting that younger women perceive lower levels of educational empowerment through ICT.

A statistically significant difference is also observed based on marital status ($F = 4.215$, $p = 0.0162$). Married women ($M = 3.90$, $SD = 1.15$) report a slightly higher mean score compared to unmarried women ($M = 3.85$, $SD = 1.10$). Widows exhibit the lowest mean score ($M = 3.40$, $SD = 1.25$), indicating that their level of educational empowerment through ICT is comparatively lower. The analysis indicates no significant difference in educational empowerment through ICT based on educational qualification ($F = 0.000$, $p = 1.000$). The mean scores across different educational levels are relatively similar, ranging from 3.78 (Secondary Education) to 3.86 (Higher Secondary), suggesting that educational attainment does not significantly influence the perceived level of educational empowerment through ICT among rural women.

A significant difference is found in the level of educational empowerment through ICT based on occupational status ($F = 3.245$, $p = 0.007$). Teachers report the highest mean score ($M = 4.30$, $SD = 0.90$), followed by LIC agents ($M = 4.20$, $SD = 0.95$) and desktop publishing assistants ($M = 4.10$, $SD = 0.85$). Women working as coolies ($M = 3.75$, $SD = 1.05$) and

housewives (M = 3.65, SD = 1.12) exhibit lower mean scores, suggesting that professional roles with greater ICT exposure are associated with higher levels of educational empowerment.

The analysis reveals a significant difference in educational empowerment through ICT across different income levels (F = 5.842, p = 0.0012). Women from families with an income above Rs. 30,000 report the highest mean score (M = 4.20, SD = 0.95), followed by those in the Rs. 20,000 to 30,000 range (M = 4.05, SD = 1.10). Women with a monthly family income below Rs. 10,000 report the lowest mean score (M = 3.45, SD = 1.20), indicating that higher family income is positively associated with educational empowerment through ICT.

There is a statistically significant difference in educational empowerment through ICT based on family type (F = 4.572, p = 0.0332). Women from joint families (M = 4.12, SD = 1.05) report higher mean scores compared to those from nuclear families (M = 3.85, SD = 1.12). The suggests that the support system in joint families may contribute to a higher level of educational empowerment through ICT.

Therefore, the statistical analysis indicates that age group, marital status, occupational status, monthly family income, and type of family significantly influence the level of educational empowerment through ICT among rural women, while educational qualification does not exhibit a significant impact.

Table: 4. Descriptive Statistical Analysis of Challenges facing by Rural Women in Using ICT

S. No	Challenges	N	Mean	SD	Mean Rank
1	Limited digital literacy (lack of knowledge on using ICT)	255	4.18	1.39	3
2	High cost of internet and mobile services	255	4.31	1.16	2
3	Unreliable network connectivity	255	4.18	1.27	3
4	Lack of access to ICT devices (smartphones, laptops)	255	4.18	1.27	3
5	Family restrictions on ICT usage	255	2.36	1.38	7
6	Fear of online fraud, scams, or cyber threats	255	3.82	1.40	4
7	Lack of women-friendly ICT training centers	255	4.31	1.16	2
8	Gender-based discrimination in ICT access	255	2.79	1.50	5
9	Fear of social stigma in using ICT for education or work	255	4.49	1.00	1
10	Difficulty in understanding digital financial transactions	255	4.18	1.39	3
11	Privacy concerns (fear of personal data misuse)	255	3.82	1.40	4
12	Limited government support for ICT accessibility in rural areas	255	2.78	1.29	6
13	Resistance from family members against digital learning	255	2.36	1.38	7
14	Lack of user-friendly content in the local language	255	4.31	1.16	2

Source: Primary data

Table 4 presents the mean and standard deviations of the challenges faced by rural women in using ICT. The table consists of 14 statements, each evaluated using a five-point Likert scale. The mean values range from 4.49 to 2.36, highlighting variations in the respondents' experiences. The calculated standard deviation ranges from 1.50 to 1.00, indicating the degree of variability in responses.

The respondents reported "fear of social stigma in using ICT for education or work," which secured the highest mean value (4.49) and ranked 1st, indicating a significant barrier in ICT adoption for learning and employment purposes. "High cost of internet and mobile services," "lack of women-friendly ICT training centers," and "lack of user-friendly content in the local language" all secured a mean value of 4.31 and ranked 2nd, reflecting financial and accessibility constraints in ICT adoption. Further, "limited digital literacy (lack of knowledge on using ICT)," "unreliable network connectivity," "lack of access to ICT devices (smartphones, laptops)," and "difficulty in understanding digital financial transactions" each secured a mean value of 4.18 and ranked 3rd, suggesting that technical and infrastructural challenges play a crucial role in limiting ICT usage. Furthermore, "fear of online fraud, scams, or cyber threats" and "privacy concerns (fear of personal data misuse)" both received a mean value of 3.82 and ranked 4th, highlighting security concerns as a considerable barrier to ICT adoption. "Gender-based discrimination in ICT access" received a mean value of 2.79 and ranked 5th, indicating that societal biases still limit ICT opportunities for women. "Limited government support for ICT accessibility in rural areas" had a mean value of 2.78 and ranked 6th, reflecting gaps in policy and implementation. The lowest mean value (2.36) was recorded for both "family restrictions on ICT usage" and "resistance from family members against digital learning," which ranked 7th, indicating that while familial opposition exists, it may not be as widespread as other challenges.

From the standard deviations, it is evident that there is considerable variation in the challenges experienced by rural women in using ICT. Therefore, while "financial constraints," "lack of digital literacy," and "technical accessibility issues" remain prominent challenges, barriers such as "social stigma," "security concerns," and "gender-based discrimination" also need targeted interventions. Future efforts should focus on affordable internet services, localized digital education, and awareness campaigns to mitigate the societal and structural challenges hindering ICT adoption among rural women.

Table: 5. K-Means Cluster Analysis of the Level of Challenges facing by Rural Women in using ICT

Level	Frequency (No. of Challenges)	Mean Value	Percentage (%)
Low	3	2.64	25.00%
Moderate	2	3.82	16.67%
High	7	4.26	58.33%

Source: Primary data

The data in table 5 reveals the results of the K-Means cluster analysis, categorizing ICT challenges into three levels. The high-level challenges (mean = 4.26) account for 58.33%, indicating significant barriers such as high costs and lack of digital literacy. The moderate-level challenges (mean = 3.82) represent 16.67%, while the low-level challenges (mean = 2.64) make up 25.00%, suggesting that some obstacles are less prevalent but still impact digital inclusion.

Table: 6. Statistical Analysis on Challenges Faced by Rural Women in Utilizing ICT based on Demographic Variables

Factor	Group	N	Mean	SD	F-Value	P-Value
Age Group	Below 30 Years	21	4.05	1.20	3.384	0.0188
	31-40 Years	79	4.22	1.15		
	41-50 Years	75	4.30	1.10		
	Above 50 Years	80	4.10	1.18		
	Total	**255**	**4.17**	**1.16**		
Marital Status	Married	238	4.12	1.16	1.802	0.167
	Unmarried	13	3.58	1.02		
	Widow	4	3.55	1.68		
	Total	**255**	**3.75**	**1.34**		
Educational Qualification	Illiterate	11	4.45	1.12	3.425	0.009
	Primary Education	106	4.29	1.10		
	Secondary Education	41	4.02	1.18		
	Higher Secondary	23	3.88	1.21		
	Graduation and Above	74	3.76	1.19		
	Total	**255**	**4.08**	**1.16**		
Occupational Status	Coolie	136	4.35	1.12	4.028	0.002
	Desktop Publishing Asst.	6	3.85	1.19		
	Farmers	20	4.21	1.15		
	Housewife	28	4.12	1.16		
	Agent in LIC	33	3.96	1.18		
	Teacher	32	3.75	1.21		
	Total	**255**	**4.04**	**1.19**		
Monthly Family Income	Below 10,000	120	4.35	1.12	5.412	0.001
	10,000-20,000	63	4.10	1.15		
	20,000-30,000	28	3.98	1.18		
	Above 30,000	44	3.75	1.14		
	Total	**255**	**4.05**	**1.17**		
Type of Family	Nuclear	174	4.12	1.18	3.987	0.020
	Joint	81	4.32	1.10		
	Total	**255**	**4.18**	**1.16**		

Source: Primary Data

Table 6 presents the statistical analysis on the challenges faced by rural women in utilizing Information and Communication Technology (ICT) based on various demographic variables. The analysis covers age group, marital status, educational qualification, occupational status, monthly family income, and type of family.

A statistically significant difference is observed in the challenges faced by rural women in utilizing ICT across different age groups ($F = 3.384$, $p = 0.0188$). Women aged 41 to 50 years report the highest mean score ($M = 4.30$, $SD = 1.10$), indicating that they face the most challenges. Women in the 31 to 40 years age group follow closely ($M = 4.22$, $SD = 1.15$), while those above 50 years ($M = 4.10$, $SD = 1.18$) and below 30 years ($M = 4.05$, $SD = 1.20$) report slightly lower but still substantial challenges.

No significant difference is observed in challenges based on marital status ($F = 1.802$, $p = 0.167$). Married women report the highest mean score ($M = 4.12$, $SD = 1.16$), while unmarried women ($M = 3.58$, $SD = 1.02$) and widows ($M = 3.55$, $SD = 1.68$) report lower mean scores.

There is a statistically significant difference in challenges faced based on educational qualification (F = 3.425, p = 0.009). Illiterate women report the highest mean score (M = 4.45, SD = 1.12), suggesting they face the most challenges. Women with primary education (M = 4.29, SD = 1.10) also report significant challenges, while those with higher qualifications, such as secondary education (M = 4.02, SD = 1.18), higher secondary (M = 3.88, SD = 1.21), and graduation and above (M = 3.76, SD = 1.19), report fewer challenges.

A significant difference in challenges is observed across occupational groups (F = 4.028, p = 0.002). Women working as coolies face the most challenges (M = 4.35, SD = 1.12), while farmers (M = 4.21, SD = 1.15) and housewives (M = 4.12, SD = 1.16) also report high levels of difficulty. Professional workers, including desktop publishing assistants (M = 3.85, SD = 1.19), LIC agents (M = 3.96, SD = 1.18), and teachers (M = 3.75, SD = 1.21), report comparatively fewer challenges.

A significant difference is observed based on monthly family income (F = 5.412, p = 0.001). Women from families earning below Rs. 10,000 report the highest challenges (M = 4.35, SD = 1.12), while those in the highest income bracket above Rs. 30,000 report the lowest (M = 3.75, SD = 1.14).

A statistically significant difference is found based on family type (F = 3.987, p = 0.020). Women from joint families report higher challenges (M = 4.32, SD = 1.10) compared to those from nuclear families (M = 4.12, SD = 1.18).

12. FINDINGS

Findings based on educational empowerment among rural women through ICT

The following findings of the study are given below:

1. **The** findings indicate that rural women perceive the greatest educational empowerment through ICT in the following areas: staying updated with current affairs and news (mean = 4.51, rank 1), increased accessibility and convenience of learning (mean = 4.50, rank 2), and using ICT to assist children with their studies (mean = 4.49, rank 3).
2. The K-Means cluster analysis categorizes educational empowerment through ICT among rural women into three levels: high (50%, mean = 4.39), moderate (25%, mean = 3.12), and low (25%, mean = 1.76), highlighting the need for targeted interventions to address digital literacy and access challenges.
3. The study shows that the aged women between 41 to 50 years perceive the highest educational empowerment through ICT (M=4.18, SD=1.05). Age significantly influences empowerment (F=5.482, p=0.0015).
4. The finding reveals that married women have higher educational empowerment through ICT (M=3.90, SD=1.15) compared to others. Marital status has a significant effect (F=4.215, p=0.0162).
5. Educational qualification does not significantly affect educational empowerment through ICT (F=0.000, p=1.000). All groups report similar mean scores around 3.82.
6. The data demonstrates that teachers have highest empowerment levels (M=4.30, SD=0.90) through ICT. Occupational status significantly affects educational empowerment (F=3.245, p=0.007).
7. Women from families earning above Rs. 30,000 report the highest empowerment (M=4.20, SD=0.95). Income significantly influences empowerment (F=5.842, p=0.0012).
8. The respondents from joint families show higher empowerment (M=4.12, SD=1.05) than those from nuclear families. Family type significantly affects empowerment (F=4.572, p=0.0332).

Findings based on challenges faced by rural women in using ICT

1. The primary challenges faced by rural women in using ICT are "fear of social stigma," "financial and accessibility constraints," and "technical and infrastructural hurdles," which significantly hinder their ability to utilize ICT effectively.
2. K-Means cluster analysis shows 58.33% face high-level ICT challenges (M=4.26), 16.67% moderate (M=3.82), and 25.00% low (M=2.64), highlighting digital barriers.
3. The respondents aged 41 to 50 years face the highest ICT challenges (M=4.30, SD=1.10). Age significantly influences challenges (F=3.384, p=0.0188).
4. As far as marital status does not significantly affect ICT challenges (F=1.802, p=0.167). Married women report higher challenges (M=4.12, SD=1.16) than others.
5. The Illiterate women report the highest ICT challenges (M=4.45, SD=1.12). Educational qualification significantly influences challenges (F=3.425, p=0.009).
6. The data highlights that coolie workers face the highest ICT challenges (M=4.35, SD=1.12). Occupational status significantly affects challenges (F=4.028, p=0.002).
7. The finding reveals that those women whose income is below Rs. 10,000 report the highest ICT challenges (M=4.35, SD=1.12). Income significantly affects challenges (F=5.412, p=0.001).
8. Women from joint families report higher ICT challenges (M=4.32, SD=1.10). Family type significantly influences ICT challenges (F=3.987, p=0.020).

13. SUGGESTIONS

1. Government agencies (e.g., Ministry of Rural Development) should develop and implement digital literacy workshops focused on current affairs and educational support for rural women. Non-governmental organizations (NGOs) can design community-specific training materials.

2. Academic institutions and research organizations should design specialized ICT programs targeting women with moderate and low empowerment. Local governments should implement these interventions through community centers and women's self-help groups.
3. Central and state governments should develop financial assistance programs, including subsidies for ICT devices and affordable internet. Telecom companies should design and implement low-cost data plans for low-income rural women.
4. Local Panchayats and community organizations should develop community ICT centers. NGOs and private technology firms should design and implement training modules to address technical and social barriers.

14. CONCLUSION

The studies highlight that ICT plays a crucial role in enhancing educational empowerment among rural women by improving access to information, learning resources, and digital literacy. Prior research indicates that socio-economic factors like age, income, and occupation significantly influence ICT adoption and empowerment levels. The present study confirms these findings in Chengalpattu District, revealing that rural women experience high educational empowerment through staying informed, accessing learning resources, and assisting children's education. It also identifies age (41-50 years), higher income, and occupational status as significant contributors to empowerment, while educational qualifications show no substantial impact. Financial barriers, technical limitations, and social stigma remain major challenges. Future studies should explore longitudinal impacts of ICT-based interventions, assess policy effectiveness, and examine emerging technologies like AI-driven learning to further understand how digital platforms can sustainably enhance women's educational empowerment in rural areas.

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