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Socio-Economic Conditions and Their Effect on Patient Perceptions of Telemedicine Devices Quality

Molagavalli Rajesh
Ph.D. Research scholar, Department of Sociology, Sri Venkateswara University, Tirupati, Andhra Pradesh, India

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Abstract:
The government's efforts to popularize telemedicine will not be successful unless users are satisfied with the quality of digital devices. Therefore, the present study aims to identify the socio-demographic factors influencing the patient community's perception of the quality of digital devices used in telemedicine. The findings of this field survey, conducted in the Chittoor district of Andhra Pradesh, have been statistically analyzed, revealing that the following socio-demographic factors serve as major barriers to the patient community's perception of the quality of digital devices used for telemedicine consultations: locality, gender, age, education, and income. It is recommended that the government initiate digital training programs for citizens in general, and the patient community in particular, to improve perceptions of the quality of digital devices.
Keywords: Telemedicine, Digital Devices Quality,Socio-demographic Factors, Patient Perception, Digital Training

Introduction:
The goal of telemedicine engagement in society is to investigate the social dynamics, relationships, and ramifications that emerge when telemedicine is incorporated into healthcare institutions and the general public. This involves studying the effects of telemedicine on patients, healthcare professionals, organizations, and larger societal systems. Some key social points to consider include existing digital gaps, where certain individuals lack access to technology or the know-how to use it. These gaps may be exacerbated by the availability and usage of telemedicine services. Sociological studies examine the impact of these discrepancies on healthcare outcomes and access. Telemedicine services must demonstrate cultural sensitivity and adaptability to various social contexts. Sociologists investigate how social issues, language barriers, and cultural norms affect the use and adoption of telemedicine in different communities.
Telemedicine, a medical innovation, unexpectedly gained popularity after the COVID-19 pandemic. There is no denying its value to society—it benefits both patients and healthcare practitioners. Telemedicine increases access to healthcare services, particularly for those in underdeveloped or remote areas with few medical facilities. This ensures that people don't have to travel long distances for medical advice and treatment. Patients can avoid taking time off work, driving to and from medical appointments, and waiting in crowded waiting rooms by using telemedicine. This reduces the overall burden of seeking medical care and saves time. Telemedicine encourages patients to be more involved in their treatment. With easier appointment scheduling and better access to medical information, patients are empowered to make informed decisions about their health. Telemedicine is especially helpful for managing chronic conditions like diabetes, hypertension, and asthma. Frequent in-person visits are unnecessary for routine check-ups and medication adjustments. By reducing overhead associated with running physical clinics and hospitals, telemedicine can help lower healthcare costs. It may also reduce unnecessary hospital stays and emergency room visits through early intervention.
For senior citizens and others with disabilities who may have difficulty traveling to doctor's appointments, telemedicine offers a lifeline, enabling them to receive healthcare in the comfort of their own homes. Telemedicine can assist people in emergencies by providing initial evaluations and medical guidance, helping them decide whether they need urgent in-

person care. It plays a significant role in destigmatizing mental health treatment by offering therapy and counseling services without the need for patients to visit a physical facility. Telemedicine has the potential to close gaps in global healthcare access by enabling medical consultations in underserved and remote areas. It also reduces the transmission of infectious diseases by allowing medical professionals to assess and advise patients remotely during disease outbreaks or public health emergencies. Even if patients cannot attend a clinic, they can still communicate regularly with their healthcare providers, promoting continuous health monitoring and timely medical intervention. Healthcare workers can share information and stay updated on the latest medical developments by using telemedicine platforms for education and training. The valuable healthcare data generated through telemedicine can contribute to research and public health efforts, improving medical knowledge and health outcomes.

Literature Review

Telemedicine has emerged as a transformative mode of healthcare delivery, especially during the COVID-19 pandemic, providing benefits such as improved accessibility, convenience, and cost-effectiveness. However, socio-economic factors significantly influence patient perceptions and adoption of telemedicine devices, leading to disparities in healthcare access. Research by Siddiqui et al. (2023) highlighted barriers like limited access to technology and unfamiliarity with telemedicine platforms, emphasizing the importance of digital literacy and equitable access. Similarly, Aneja (2022) found high patient satisfaction with telemedicine despite challenges, stressing the need for continuous evaluation of telemedicine services to address emerging issues and enhance service quality. These findings indicate that socio-economic factors, including income and education levels, play a critical role in shaping patient perceptions of telemedicine device quality.

The role of social connectivity in telemedicine further underscores the importance of addressing socio-economic disparities. Watson, Lupton, and Michael (2021) demonstrated how digital platforms maintain patient-provider communication and social support during crises, while Kodali et al. (2020) identified user-centric design and responsive technological solutions as key factors influencing patient perceptions of telemedicine tools. Arcury et al. (2020) found that computer anxiety negatively affected eHealth literacy among low-income older adults, suggesting the need for targeted educational interventions. These findings collectively highlight the intersection of socio-economic status and digital literacy, underscoring the necessity of addressing these gaps to ensure equitable telemedicine adoption.

Digital divide and health equity remain critical concerns in telemedicine adoption. Azzopardi-Muscat & Sørensen (2019) emphasized that while digital technologies have the potential to bridge healthcare gaps, they can also exacerbate disparities if not implemented equitably. Granger (2016) and Lustria, Smith, and Hinnant (2011) underscored the influence of socio-demographic factors like income, education, and familiarity with technology on telemedicine adoption. Additionally, Skinner, Biscope, and Poland (2003) found that privacy and internet access significantly shape patient trust in digital platforms. Addressing these issues requires targeted strategies such as subsidizing technology, promoting digital literacy, and improving digital infrastructure to enhance perceptions of telemedicine device quality.

Despite existing research addressing various aspects of telemedicine adoption, a significant research gap remains regarding the influence of socio-economic conditions on patient perceptions of digital device quality in telemedicine. While studies like Siddiqui et al. (2023) and Aneja (2022) explore barriers to telemedicine and patient satisfaction, they do not deeply examine how socio-demographic factors—such as income, education, and locality—directly impact perceptions of telemedicine devices. Furthermore, while research by Arcury et al. (2020) and Azzopardi-Muscat & Sørensen (2019) highlights issues related to digital literacy and health equity, they do not specifically address how these factors influence patients' evaluations of the quality of telemedicine tools. Additionally, studies like Granger (2016) and Lustria, Smith, and Hinnant (2011) focus on technology preferences but fail to integrate socio-economic disparities in shaping these preferences. There is a need for more research to explore how socio-economic conditions affect patient perceptions and to develop strategies for improving telemedicine accessibility and effectiveness across diverse populations.

Objectives:

- To study the influence of various socio-demographic factors of the patient community on patients' perceptions of the quality of digital devices used for telemedicine consultations.
- To suggest ways to overcome the impediments posed by socio-demographic factors in developing a positive perception of the quality of telemedicine's digital devices in the minds of patients.

Hypothesis:

- There is no significant association between the Socio-demographic profile of the respondents and their perception on the Quality of digital devices

Research Methodology:

Area of the Study

Chittoor district in Andhra Pradesh was purposively selected for the present study. According to the 2011 census, Chittoor district had a population of 4,174,064, with 2,090,204 males and 2,083,860 females. In Andhra Pradesh, e-Sanjeevani Telemedicine services were introduced after the COVID-19 pandemic. The Andhra Pradesh government established three Telemedicine hubs in November 2020 to meet the healthcare needs of the people. One of these hubs is located in Tirupati, which provides healthcare services to Chittoor district through telemedicine. The nature of the research is descriptive.

Sample Size And Distribution

Users of the e-Sanjeevani Telemedicine platform accessed through the sub-centers and UPHCs in Chittoor district were referred to as the universe of the study. Between January 1 and December 31, 2021, there were 8,180 telemedicine consultations through the e-Sanjeevani platform in the Chittoor area. The sample size is 5% of all consultations, which equals 409 (0.05 * 8,180). A purposive sampling strategy was adopted for data collection. In Chittoor district, there are 522 sub-centers with telemedicine facilities and 35 UPHCs. This gives a total of 557 centers with telemedicine capabilities (522 + 35). The sample was drawn from 7% of the total number of centers with e-Sanjeevani Telemedicine access, which equals 39 centers (0.07 * 557). The number of centers selected for sampling in each revenue division of Chittoor district was determined based on the percentage of total centers with telemedicine capabilities in each division. The sample from each center was carefully chosen based on availability and willingness to participate in the interview process. Efforts were made to ensure that the sample represents various social backgrounds.

Table 1: Sample distribution in Chittoor District

Revenue Division	**Centres having Telemedicinefaciligy**	**Percentage**	**Number of centres taken for sampling**
Madanpalli	228	40.93	0.4093*39=16
Tirupati	173	31.06	0.3106*39=12
Chittoor	156	28.00	0.28*39=11
Total	557	100	39

Data Analysis:

Table 2: Socio-demographic details of the Respondents

Socio-demographic variables	**Response**	**Frequency**	**Percent**

Locality	Rural	281	68.70
	Urban	128	31.30
	Total	409	100.00
Gender	Male	217	53.06
	Female	192	46.94
	Total	409	100.00
Age	0-20 Years	36	8.80
	21-35 Years	116	28.36
	36-55 Years	152	37.16
	56 and above	105	25.67
	Total	409	100.00
Religion	Hindu	331	80.93
	Muslim	41	10.02
	Christian	37	9.05
	Total	409	100.00
Caste	OC	91	22.25
	BC	198	48.41
	SC	84	20.54
	ST	36	8.80
	Total	409	100.00
Occupation	Formal	33	8.07
	Informal	376	91.93
	Total	409	100.00
Education	Illiterate	138	33.74
	1-5th class	51	12.47
	6-7th class	56	13.69
	8-10th class	55	13.45
	intermediate	65	15.89
	Degree and above	44	10.76
	Total	409	100.00
Monthly Income	Below 5000	38	9.29
	5001 - 10000 Rupees	175	42.79
	10001 - 15000 Rupees	120	29.34
	15001 - 20000 Rupees	42	10.27
	20001 Rupees and Above	34	8.31
	Total	409	100.00

Table 3: Responses of the Patients on Quality of Digital devices

Quality of digital devices	Response	Frequency	Percent
The video quality is good	Strongly Agree	1	0.24

	Agree	43	10.51
	Neither Agree Nor Disagree	229	55.99
	Disagree	134	32.76
	Strongly Disagree	2	0.49
	Total	409	100.00
The sound quality is good	Strongly Agree	4	0.98
	Agree	228	55.75
	Neither Agree Nor Disagree	175	42.79
	Disagree	2	0.49
	Total	409	100.00
The prescription quality in the text is good	Strongly Agree	31	7.58
	Agree	251	61.37
	Neither Agree Nor Disagree	124	30.32
	Disagree	3	0.73
	Total	409	100.00
The speed of digital devices is good	Strongly Agree	7	1.71
	Agree	157	38.39
	Neither Agree Nor Disagree	241	58.92
	Disagree	4	0.98
	Total	409	100.00
The speed of the internet adequate	Strongly Agree	1	0.24
	Agree	56	13.69
	Neither Agree Nor Disagree	280	68.46
	Disagree	67	16.38
	Strongly Disagree	5	1.22
	Total	409	100.00

Table 4: Testing the significance of the Null Hypothesis

Variables	Response	N	Mean Rank	KWH/MU values

Locality	Rural	281	190.53	U=13917.500 P=.001***
	Urban	128	236.77	
Gender	Male	217	232.46	U=14874.000 P=.001***
	Female	192	173.97	
Age	0-20 Years	36	247.25	χ^2=10.923 Df=3 P=.012*
	21-35 Years	116	221.84	
	36-55 Years	152	195.11	
	56 and above	105	186.23	
Religion	Hindu	331	206.16	χ^2=1.876 Df=2 P=.391@
	Muslim	41	183.67	
	Christian	37	218.24	
Caste	OC	91	231.16	χ^2=6.702 Df=3 P=.082@
	BC	198	195.22	
	SC	84	206.83	
	ST	36	188.39	
Educational Qualification	Illiterate	138	166.76	χ^2=25.248 Df=5 P=.001***
	1-5th class	51	202.20	
	6-7th class	56	229.70	
	8-10th class	55	227.84	
	Intermediate	65	223.25	
	Degree and above	44	241.24	
Occupation Status	Formal	33	251.50	U=4669.500 P=.017*
	Informal	376	200.92	
Monthly Income	Below ₹5000	38	175.16	χ^2=21.572 Df=4 P=.001***
	₹5001 - 10000	175	184.00	
	₹10001 - 15000	120	217.37	
	₹15001 - 20000	42	234.33	
	₹20001 and above	34	266.54	
	Total	409		

Significance Level: p<0.001***, p<0.01**, p<0.05*, @-Not Significant
Source of Data: Primary

Interpretation:

The KWH/MU test was carried out to assess the association between the quality of digital devices used for telemedicine consultations and the socio-demographic characteristics of the respondents. The following table provides the association analysis data concerning the corresponding research findings.

The socio-demographic variables (Locality, Gender, Age, Religion, Caste, Educational Qualification, Occupational Status, and Monthly Income) were analyzed to determine the strength of their association with the quality of digital devices used for telemedicine consultations.

The results of Table No. 4 from the KWH test, or Mann-Whitney U test, indicate that the respondents' perceptions of the quality of digital devices are significantly associated with the following six socio-demographic variables: (i) Locality (U=13,917.500, p<0.001), (ii) Gender (U=14,874.000, p<0.001), (iii) Age (χ2=10.923, p<0.05), (iv) Educational

Qualification ($\chi2$=25.248, p<0.001), (v) Occupation Status (U=4,669.500, p<0.05), and (vi) Monthly Income ($\chi2$=21.572, p<0.001).

Locality: Urban respondents registered a higher mean score (M=236.77) on their perception of the quality of digital devices, compared to rural respondents (M=190.53). This suggests that urban respondents have a better perception of the quality of digital devices used for telemedicine consultations than their rural counterparts.

Gender: Male respondents had a higher mean score (M=232.46) regarding the perception of digital device quality than female respondents (M=173.97). This indicates that male respondents generally perceive the quality of telemedicine devices as being better than female respondents.

Age: Respondents in the 0-20 age group registered the highest mean score (M=247.25) regarding the quality of digital devices. The mean scores of the other age groups were as follows: (a) 21-35 Years (M=221.84), (b) 36-55 Years (M=195.11), and (c) 56 and above (M=186.23). This indicates that younger respondents perceive the quality of telemedicine devices more favorably than older respondents, and perception of digital device quality tends to decline with age.

Educational Qualification: Respondents with a Degree or higher qualification registered the highest mean score (M=241.24) regarding digital device quality. Other educational groups had the following mean scores: (a) Intermediate (M=223.25), (b) 8-10th class (M=227.84), (c) 6-7th class (M=229.70), (d) 1-5th class (M=202.20), and (e) Illiterate (M=166.76). Thus, those with higher educational qualifications perceived the quality of digital devices used for telemedicine consultations to be the highest.

Occupation Status: Respondents in the formal sector reported a higher mean score (M=251.50) on the quality of digital devices compared to respondents in the informal sector (M=190.92). This suggests that formal sector workers perceived the quality of telemedicine devices as being higher than informal sector workers.

Monthly Income: Respondents in the "High monthly income (₹20,001 and above)" group registered the highest mean score (M=241.24) for their perception of digital device quality. The mean scores for the other income groups were: (a) ₹15,001-20,000 (M=234.33), (b) ₹10,001-15,000 (M=217.37), (c) ₹5,001-10,000 (M=184.00), and (d) Below ₹5,000 (M=175.16). This indicates that higher monthly income is positively associated with better perceptions of the quality of digital devices used for telemedicine consultations.

In contrast, the respondents' perceptions of the quality of digital devices were not significantly associated with **Religion** ($\chi2$=4.102, p=0.129) and **Caste** ($\chi2$=1.647, p=0.649). Therefore, religion and caste do not appear to significantly influence the respondents' perceptions of the quality of digital devices used in telemedicine consultations.

Conclusion:

The study reveals significant associations between socio-demographic factors and patients' perceptions of the quality of digital devices used for telemedicine consultations. Key factors influencing these perceptions include locality, gender, age, educational qualification, occupation status, and monthly income. Urban respondents, males, younger individuals, those with higher educational qualifications, formal sector workers, and those with higher income levels tended to have more favorable perceptions of digital devices used for telemedicine consultations. In contrast, religion and caste were found to have no significant impact on these perceptions. These findings highlight the need for tailored approaches to address the diverse needs of different socio-demographic groups, ensuring that telemedicine services reach all segments of the population effectively.

Suggestions:

- Governments should focus on urban-rural disparities by improving digital infrastructure in rural areas and promoting awareness about telemedicine services.
- Telemedicine platforms should ensure that the quality of services and devices is consistently high across both genders, addressing any potential barriers that might contribute to gender differences in perception.

- Tailored training programs should be designed for older age groups to enhance their confidence and familiarity with telemedicine technologies.
- Policies should address educational and income disparities by providing access to training and affordable devices, especially for lower-income and less-educated groups.
- Continuous monitoring and feedback mechanisms should be established to ensure the consistent quality of digital devices used in telemedicine services, particularly in underserved areas.

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