Research Article

Knowledge And Utilization of Government-Supported Telemedicine Services Among Rural Adults: A Cross-Sectional Study

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Abstract

Telemedicine has emerged as an important strategy for improving access to healthcare, particularly for populations living in geographically remote and underserved areas. Although government-supported digital health services have expanded in India, their effective use depends substantially on public awareness, digital literacy, accessibility, and confidence in remote healthcare delivery. Evidence regarding the knowledge and utilization of government-supported telemedicine services among rural populations remains limited in several local contexts. **Objectives:** To assess knowledge and utilization of government-supported telemedicine services among adults residing in selected rural areas and to determine the association of knowledge and utilization with selected demographic characteristics and the relationship between knowledge and utilization. **Methods:** A quantitative, non-experimental descriptive analytical design was adopted. The study was conducted among 110 adults residing in selected rural areas. Participants were selected using non-probability purposive sampling. Data were collected using a self-structured instrument comprising a demographic data sheet, a 10-item Telemedicine Knowledge Questionnaire, and a 10-item Telemedicine Utilization Rating Scale. Content validity was established by 17 experts, with a content validity index of 0.98 for both instruments. Cronbach's alpha coefficients were 0.790 for the knowledge questionnaire and 0.833 for the utilization scale. Descriptive statistics, Fisher's exact test, and Pearson's correlation coefficient were used for analysis. Statistical significance was set at $p<0.05$. **Results:** Most participants had poor knowledge of telemedicine services (94/110, 85.5%), while only 14 (12.7%) had average knowledge and 2 (1.8%) had good knowledge. Similarly, 96 participants (87.0%) reported low utilization, 12 (11.0%) reported moderate utilization, and 2 (2.0%) reported high utilization. No statistically significant association was observed between knowledge and age, gender, occupation, education, monthly income, or socioeconomic class ($p>0.05$). Utilization was likewise not significantly associated with the selected demographic characteristics. A strong positive correlation was observed between knowledge and utilization scores ($r=0.785$, $p<0.001$). **Conclusion:** The findings indicate substantial gaps in both knowledge and utilization of government-supported telemedicine services among the rural population studied. The strong positive relationship between knowledge and utilization suggests that improving awareness and digital health literacy may contribute to greater engagement with telemedicine. Community-based education, health-worker-led awareness activities, and strengthened digital health support may improve the accessibility and effective use of telemedicine services in rural communities.

Keywords: Telemedicine; Digital health; Rural population; Telehealth utilization; Health literacy; Healthcare accessibility.

Introduction

Telemedicine enables healthcare to be delivered across geographical distances through telecommunications and digital technologies. It can facilitate clinical consultation, health assessment, follow-up, monitoring, and health education when patients and healthcare professionals are not physically located in the same place. Technological advances in internet connectivity, mobile devices, broadband networks, and digital platforms have expanded the potential of telemedicine beyond conventional telephone-based consultation to include real-time video consultation, remote monitoring, and store-and-forward communication.

The potential value of telemedicine is particularly relevant to rural populations, where geographical distance, transportation difficulties, limited specialist availability, and inadequate healthcare infrastructure can restrict access to appropriate healthcare. The study context reflects these challenges, as rural communities may experience longer travel distances, transportation costs, and limited access to healthcare professionals compared with urban populations. These barriers become increasingly important for individuals requiring regular follow-up or specialist consultation.

India has increasingly incorporated digital technologies into healthcare delivery. Government-supported initiatives, including eSanjeevani and the Ayushman Bharat Digital Mission, have sought to expand access to digitally enabled

healthcare services. However, availability of a digital service does not necessarily translate into effective utilization. Awareness of the service, understanding of how it works, digital literacy, accessibility, perceived usefulness, and confidence in remote consultations may influence adoption.

Methods

Study design and setting

A quantitative, non-experimental descriptive analytical design was used. The study was conducted in selected rural areas of Sangli district, Maharashtra, India. The target population comprised adults residing in Sangli district, while the accessible population consisted of adults residing in the selected rural areas included in the study.

Participants and sampling

A total of 110 participants were included. The minimum sample size was initially calculated using Cochran's formula for estimating a single proportion: $\mathbf{n = Z^2pq/d^2}$ where Z was 1.96 at a 95% confidence level, p was 0.38 based on previous research, q was 0.62, and d was 0.10. The calculated minimum sample size was 91. The final sample was increased to 110 to account for potential non-response or incomplete information. Participants were selected through non-probability purposive sampling.

Participants were eligible if they were willing to provide written informed consent and owned a smartphone with internet access. Individuals who were unable to communicate, use a communication device, process information, or comprehend the study questions were excluded, as were temporary residents of Sangli district

Data collection instruments

Data were collected using a self-structured instrument developed from the study objectives, conceptual framework, relevant literature, government directives, and previous research concerning telemedicine. Input from experts in community medicine and community health nursing, as well as informal discussions with rural residents and healthcare workers, was used to assess clarity, feasibility, and contextual appropriateness.

The instrument consisted of three sections:

Section I: Demographic characteristics.

Information was obtained regarding age, gender, occupation, educational status, monthly income, and socioeconomic class.

Section II: Telemedicine Knowledge Questionnaire.

The questionnaire consisted of 10 multiple-choice questions addressing telemedicine concepts, government telemedicine platforms, available services, legal validity, privacy, consent, and benefits. Each correct response received one mark, while an incorrect or "don't know" response received zero. Total scores ranged from 0 to 10 and were categorized as poor (0–4), average (5–7), and good (8–10).

Section III: Telemedicine Utilization Rating Scale.

The scale comprised 10 statements assessing frequency of use, accessibility, usefulness, contact with healthcare professionals, satisfaction, and intention to use telemedicine in the future. Responses were scored on a three-point scale: often=3, sometimes=2, and never=1. Total scores ranged from 10 to 30 and were classified as low (10–16), moderate (17–23), and high (24–30) utilization.

Ethical considerations and data collection

Ethical approval was obtained from the Institutional Ethics Committee of Bharati Vidyapeeth (Deemed University), College of Nursing, Sangli. Permission was obtained from the authorities of the selected villages. Participants received information regarding the study purpose, procedures, and their rights before providing written informed consent. Participation was voluntary, and participants were informed that they could withdraw without penalty. Privacy, confidentiality, and anonymity were maintained throughout the study.

Results

Participant characteristics

The study included 110 rural adults. Most participants (67%) were aged 36–55 years, while 33% were aged 18–35 years. The gender distribution was equal, with 55 males and 55 females. Agricultural and fishery-related occupations represented the largest occupational category (65%). Regarding educational attainment, 45% had completed high school and 32% had completed middle school. Ten percent were graduates or postgraduates and 9% had intermediate or diploma-level education. More than half of the participants (55%) reported a monthly income of ₹23,870–39,829, while 45% reported ₹7,989–23,869. The majority (83%) belonged to the lower-middle socioeconomic class, followed by the upper-lower class (13%) and upper-middle class (5%).

Knowledge of telemedicine services

A substantial majority of participants demonstrated poor knowledge regarding telemedicine services. Ninety-four participants (85.5%) had poor knowledge, 14 (12.7%) had average knowledge, and only 2 (1.8%) had good knowledge.

Table 1. Knowledge level regarding government-supported telemedicine services (n=110)

Knowledge level	n	Percentage
Poor	94	85.5
Average	14	12.7
Good	2	1.8
Total	**110**	**100.0**

Utilization of telemedicine services

Utilization was similarly limited. Ninety-six participants (87.0%) were categorized as having low utilization, 12 (11.0%) had moderate utilization, and only 2 (2.0%) had high utilization.

Table 2. Utilization level of government-supported telemedicine services (n=110)

Utilization level	n	Percentage
Low	96	87.0
Moderate	12	11.0
High	2	2.0
Total	**110**	**100.0**

Association between knowledge and demographic characteristics

Fisher's exact test demonstrated no statistically significant association between knowledge level and any of the demographic variables examined. The p-values were 0.516 for age, 0.693 for gender, 0.104 for occupation, 0.366 for education, 0.625 for monthly income, and 0.362 for socioeconomic class.

Table 3. Association between knowledge level and selected demographic variables (n=110)

Variable	Fisher's exact test	p-value	Interpretation
Age	1.382	0.516	NS
Gender	1.524	0.693	NS
Occupation	15.043	0.104	NS
Education	8.151	0.366	NS
Monthly income	1.425	0.625	NS
Socioeconomic class	4.361	0.362	NS

NS = not significant; $p<0.05$ considered significant.

Association between utilization and demographic characteristics

No statistically significant association was identified between utilization level and the demographic variables examined. The p-values were 0.774 for age, 0.124 for gender, 0.059 for occupation, 0.410 for education, 0.609 for monthly income, and 0.309 for socioeconomic class.

Table 4. Association between utilization level and selected demographic variables (n=110)

Variable	Fisher's exact test	p-value	Interpretation
Age	0.889	0.774	NS
Gender	3.525	0.124	NS
Occupation	16.496	0.059	NS
Education	7.706	0.410	NS
Monthly income	1.445	0.609	NS
Socioeconomic class	4.901	0.309	NS

NS = not significant; p<0.05 considered significant.

Relationship between knowledge and utilization

Pearson's correlation analysis demonstrated a strong positive relationship between total knowledge and utilization scores (r=0.785, p<0.001).

Table 5. Correlation between knowledge and utilization scores (n=110)

Variables	Pearson's r	p-value
Knowledge and utilization	0.785	<0.001

Discussion

This study identified substantial gaps in knowledge and utilization of government-supported telemedicine services among adults residing in selected rural areas of Sangli district. More than four-fifths of participants had poor knowledge, while nearly nine-tenths reported low utilization. These findings are important because the expansion of digital health infrastructure alone may not ensure equitable access to digitally delivered healthcare.

The demographic profile showed that two-thirds of participants were aged 36–55 years and that males and females were equally represented. Agriculture and related occupations constituted the largest occupational group. This pattern is consistent with the rural setting of the study and provides an important context for understanding access to healthcare technologies. The original study also noted that the educational profile was predominantly secondary or middle-school level, which may influence familiarity with more complex digital healthcare systems.

Implications for Practice and Public Health

The findings have several implications for healthcare delivery in rural settings.

First, community-based digital health education should be incorporated into routine health promotion activities. Community health nurses, primary healthcare personnel, and other frontline workers can provide practical demonstrations of telemedicine services.

Second, digital health literacy should be considered an important component of rural health education. Information should be presented in simple, locally understandable language and should focus on practical use rather than technical terminology.

Third, healthcare professionals can act as facilitators of telemedicine adoption by introducing appropriate patients to available services and assisting them with the initial process of accessing teleconsultation.

Fourth, improving utilization requires attention to system-level barriers, including internet connectivity, device accessibility, technical assistance, continuity of care, and referral mechanisms.

Finally, future interventions should evaluate whether structured community education can produce measurable improvements in knowledge, confidence, and actual utilization of telemedicine services.

Conclusion

This study demonstrates a substantial gap in knowledge and utilization of government-supported telemedicine services among adults in selected rural areas of Sangli district. The majority of participants had poor knowledge and low utilization, while only a very small proportion demonstrated good knowledge or high utilization.

No significant relationship was identified between knowledge or utilization and the demographic characteristics examined. In contrast, a strong positive correlation was observed between knowledge and utilization. This finding suggests that improving awareness and understanding of telemedicine may be an important component of efforts

to increase its use, although further intervention-based research is required to establish whether improving knowledge produces sustained changes in utilization.

Strengthening community-based digital health education, improving digital literacy, supporting individuals in accessing telemedicine platforms, and integrating telemedicine promotion into primary healthcare activities may contribute to more equitable access to healthcare among rural populations.

Declarations

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Conflict of Interest: The authors declare no conflict of interest involved.

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References

1. World Health Organization. Global survey on digital health: 2022 status report. Geneva: World Health Organization; 2022.
2. Smith J, et al. Telemedicine in low-income countries: outcomes and challenges. J Glob Health. 2021; 11:04017.
3. Indian Council of Medical Research. Non-Communicable Diseases in India: State Profiles. New Delhi: ICMR; 2022.
4. Singh R, Verma S. Awareness of government teleconsultation services in rural Uttar Pradesh & Bihar: a cross-sectional survey. J Community Health. 2022;47(6):1012-1018.
5. Tracy J, Behura SS, Patel AR. Knowledge and barriers to digital health among older rural populations in Odisha. Indian J Public Health. 2023;67(4):354-360.
6. National Health Authority. Ayushman Bharat Digital Mission: Annual Report 2023. New Delhi: National Health Authority; 2023.
7. Census of India. Rural occupational distribution in Maharashtra. New Delhi: Government of India; 2011.
8. Kruse CS, Krowski N, Rodriguez B, Tran L, Vela J, Brooks M. Telehealth and patient satisfaction: a systematic review and narrative analysis. BMJ Open. 2017;7(8):e016242.
9. Reddy BV, Gupta A, Lohiya A, Kharya P. Telemedicine in rural India: a study of awareness, barriers, and acceptance. J Family Med Prim Care. 2020;9(9):4791-4796.
10. Ministry of Health and Family Welfare. eSanjeevani: National telemedicine service. New Delhi: Ministry of Health and Family Welfare; 2021.
11. Dash S, Aarthy R, Mohan V. Telemedicine during COVID-19 in India—a new policy and its challenges. J Public Health Policy. 2021;42(3):501-509.
12. George S, Hamilton A, Baker RS. How do low-income urban and rural populations perceive telemedicine? J Health Care Poor Underserved. 2012;23(2):758-772.
13. World Health Organization. Telemedicine: opportunities and developments in Member States. Geneva: World Health Organization; 2010.