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Original Article

Awareness, Utilization, and Barriers to Telemedicine Services (eSanjeevani) Among Adults in Rural Communities of Hisar District, Haryana, India: A Community-Based Cross-Sectional Study

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Abstract

Background:

Telemedicine, particularly the national eSanjeevani platform, has the potential to bridge healthcare gaps in rural India. However, its actual reach in northern agrarian regions remains understudied.

Objective:

To assess awareness, utilization, willingness, and barriers to telemedicine services among rural adults in Hisar district, Haryana.

Methods: A community-based cross-sectional study was conducted among 758 adults aged ≥18 years selected through multistage random sampling from 12 villages during October 2024–March 2025. Data were collected using a pre-tested semi-structured questionnaire.

Results:

Awareness of telemedicine/eSanjeevani was only 18.5% (95% CI: 15.8–21.5). Utilization in the past year was 4.1%, with eSanjeevani use at 2.9%. However, 62.4% expressed willingness to use telemedicine in the future. Major barriers included lack of awareness (68.7%), poor digital literacy (45.2%), unreliable internet (39.8%), and preference for in-person visits (32.5%). Higher education, younger age, and smartphone ownership were independent predictors of awareness ($p<0.001$).

Conclusion:

Despite low awareness and utilization, high willingness indicates strong potential for telemedicine in rural Haryana. Targeted awareness campaigns, digital literacy programmes, and infrastructure strengthening are urgently needed to improve uptake.

Keywords

Telemedicine, eSanjeevani, Awareness, Utilization, Barriers, Rural India, Haryana, Digital health, Community-based study.

INTRODUCTION

Telemedicine has emerged as a transformative approach to healthcare delivery, offering capabilities in remote consultation, diagnosis, monitoring, and follow-up while addressing geographical, infrastructural, and specialist shortages, particularly in low- and middle-income countries [1]. In India, where nearly 65% of the population lives in rural areas with over 75% of doctors concentrated in urban centres, telemedicine holds significant potential to improve access to primary healthcare services [2]. The national eSanjeevani platform under the Ayushman Bharat Digital Mission has demonstrated remarkable scalability, recording over 163 million consultations between 2019 and 2023 for various services, including chronic disease management, maternal and child health, and infectious disease support [3]. The COVID-19 pandemic acted as a major catalyst for telemedicine adoption in India through new policy frameworks and rapid digital expansion, though it also exposed several implementation challenges [4,5]. Systematic reviews have highlighted the capabilities, features, applications, as well as persistent barriers such as digital literacy, internet connectivity, privacy concerns, and trust deficits in the Indian setting [6,7]. Community-based cross-sectional studies from rural regions have consistently reported low awareness and utilization of telemedicine services, including eSanjeevani [8,9].

Studies conducted in rural Karnataka and South India revealed awareness levels ranging from 2% to 20% with very low recent utilization rates, despite moderate to high willingness to adopt these services when made available [8,10]. Diagnostic concordance between telemedicine and face-to-face care in rural primary health clinics has been demonstrated through randomized trials, supporting its clinical reliability for primary care [11]. Mixed-method evaluations from western India and stakeholder experiences at government medical colleges further indicate that while healthcare providers perceive value, patient uptake remains suboptimal due to sociocultural and technological barriers [12,13].

Qualitative assessments of barriers and facilitators, including volunteer telemedicine engagement during the pandemic and integration of AI applications in rural healthcare, have emphasized the need for targeted, context-specific interventions [14,15]. Earlier initiatives, such as the Karnataka State Telemedicine Project and studies on awareness and attitudes among doctors and patients, provide important foundational insights that continue to inform current evaluations [16,17]. Additional explorations focusing on rural primary care, client-provider experiences in states like Jharkhand, and utilization patterns in Uttar Pradesh reinforce the importance of addressing ground-level challenges [18,19,20].

Cross-sectional studies on promoters and barriers in rural settings, along with systematic reviews of telehealth applications during and beyond the COVID-19 era, have called for localized research to develop scalable and equitable models [21,22]. Despite national progress, significant regional disparities persist, with limited community-level data available from northern states such as Haryana, particularly in agrarian districts like Hisar, where access to specialists remains constrained [1,2,22].

Given this background and the paucity of recent data specific to rural Haryana, the present study was undertaken to assess awareness, utilization patterns, willingness, and perceived barriers to telemedicine services (particularly eSanjeevani) among adults in rural communities of Hisar district. The findings are expected to provide evidence for strengthening digital health integration under national programs [3,21].

METHODOLOGY

Study Design

This was a community-based, descriptive cross-sectional study conducted to assess awareness, utilization, willingness, and barriers related to telemedicine services among rural adults.

Study Setting

The study was carried out in 12 randomly selected villages under the rural field practice area of Government Medical College, Hisar, Haryana. Hisar district is located in western Haryana and is predominantly agrarian with limited access to specialist healthcare services. The study was conducted from October 2024 to March 2025.

Study Population

All individuals aged 18 years and above, who had been residing in the selected villages for at least one year before the study, were eligible to participate. Pregnant women, individuals with critical illness, those with severe cognitive impairment, and persons unwilling to provide consent were excluded.

Sample Size Calculation

The sample size was calculated using the formula for estimating proportions:

$n = Z^2 p (1-p) / d^2$

where Z = 1.96 (for 95% confidence level),

p = 0.185 (anticipated awareness of telemedicine based on previous rural Indian studies [8]),

d = 0.04 (absolute precision).

Considering a design effect of 2.0 for multistage sampling and 10% non-response rate, the final calculated sample size was 800 participants.

Sampling Technique

A multistage random sampling method was employed. In the first stage, out of the total rural blocks in Hisar district, two blocks were randomly selected. In the second stage, 12 villages were randomly chosen from the selected blocks using a random number table. In the third stage, households in each village were selected using systematic random sampling from the updated voter list or Anganwadi registers. One eligible adult per household was selected using the Kish grid method to ensure random selection within the household.

Study Tools

A pre-designed, pre-tested, semi-structured questionnaire

was used for data collection. The questionnaire was developed in English and translated into Hindi. It consisted of four sections:

1. Socio-demographic characteristics (age, sex, education, occupation, income, etc.)
2. Awareness and utilization of telemedicine/eSanjeevani
3. Willingness to use telemedicine services
4. Perceived barriers (using multiple-response and Likert-scale questions)

The questionnaire was adapted from validated tools used in previous studies [2,8,14] and modified as per the local context. It was pre-tested on 30 non-sample participants in a nearby village, and necessary modifications were made. Smartphone ownership and internet access were also recorded.

Data Collection Procedure

House-to-house visits were made by trained field investigators (postgraduate students and medical social workers) under the supervision of the principal investigator. Written informed consent was obtained from each participant after explaining the purpose of the study. Interviews were conducted in a private setting to ensure confidentiality. Each interview lasted approximately 15–20 minutes. Data were collected during daytime hours convenient to the participants.

Operational Definitions

- Awareness: Participant had heard of the term "telemedicine" or "eSanjeevani" and could correctly describe at least one basic feature.
- Utilization: Self-reported use of any telemedicine service (government or private) in the past 12 months.
- Willingness: Expressed readiness to use telemedicine services in the future if available locally.

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of Government Medical College, Hisar (IEC Reference No: GMCH/Hisar/IEC/2024/67 dated 12.09.2024). Written informed consent was obtained from all participants. Participation was voluntary, and participants had the right to withdraw at any time. Strict confidentiality of data was maintained, and no personal identifiers were recorded in the final dataset.

Data Management and Statistical Analysis

Data were entered into Epi Info version 7.2 and exported to IBM SPSS Statistics version 26.0 for analysis. Descriptive statistics were expressed as frequencies, percentages, means, and standard deviations. Inferential statistics included a chi-square test for associations between categorical variables. Multivariable binary logistic regression was performed to identify independent predictors of awareness and willingness. A p-value < 0.05 was considered statistically significant. Results were presented in tables and figures.

RESULTS

A total of 800 participants were approached, of whom 758 completed the interview, yielding a response rate of 94.8%.

The socio-demographic profile of the study participants is presented in Table 1. The mean age of the participants was 42.8 ± 15.6 years. Nearly half of the participants (48.4%) owned a smartphone, while only 39.7% had reliable internet access at home.

Awareness and utilization of telemedicine services are shown in Figure 1. Overall, awareness of telemedicine or eSanjeevani was low, at 18.5% (140/758; 95% CI: 15.8–21.5%). Only 4.1% of participants had used any telemedicine service in the past year, and just 2.9% had specifically used the government's eSanjeevani platform.

The major barriers reported by participants are summarized in Table 2. Lack of awareness was the most common barrier, followed by poor digital literacy and unreliable internet connectivity.

Table 1: Socio-demographic profile of the study participants (n=758)

Characteristic	Category	n (%)
Age (years)	18–39	318 (41.9)
	40–59	289 (38.1)
	≥60	151 (19.9)
Sex	Male	388 (51.2)
	Female	370 (48.8)
Education	Illiterate	264 (34.8)
	Primary to Middle	218 (28.8)
	Secondary & above	276 (36.4)
Smartphone Ownership	Yes	367 (48.4)
	No	391 (51.6)
Reliable Internet Access	Yes	301 (39.7)
	No	457 (60.3)

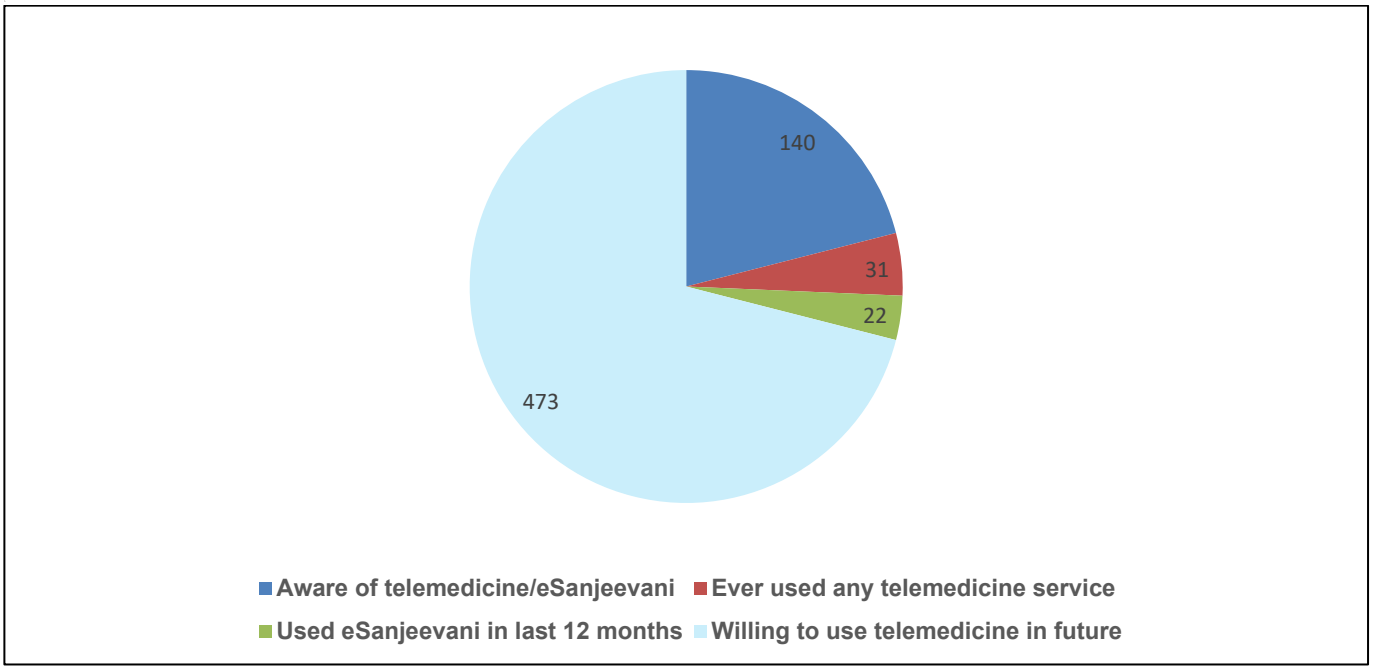

Figure 1: Awareness, Utilization and Willingness towards Telemedicine Services (n=758)

Table 2: Major Barriers to Telemedicine Use (Multiple responses, n=758)

Barrier	n (%)
Lack of awareness	521 (68.7)
Poor digital literacy/technical difficulty	342 (45.2)
Unreliable internet/electricity	302 (39.8)
Preference for in-person visit	246 (32.5)
Privacy and confidentiality concerns	128 (16.9)
Language barrier	97 (12.8)
Distrust in online consultation	89 (11.7)

Table 3: Predictors of Awareness of Telemedicine (Multivariable Logistic Regression)

Variable	Adjusted Odds Ratio (95% CI)	p-value
Age 18–39 years	3.12 (1.89–5.16)	<0.001
Secondary education & above	4.85 (2.78–8.46)	<0.001
Male sex	1.68 (1.12–2.52)	0.012
Smartphone ownership	2.94 (1.95–4.43)	<0.001
Reliable internet access	2.41 (1.58–3.68)	<0.001

Table 3 presents the factors significantly associated with awareness of telemedicine. Awareness was significantly higher among younger participants, males, educated individuals, smartphone owners, and those with reliable internet

DISCUSSION

The present community-based cross-sectional study in rural Hisar district, Haryana, documented low awareness (18.5%) and utilization (4.1%) of telemedicine services, including the national eSanjeevani platform (2.9% in the past year), despite a reasonably high willingness to use these services in the future (62.4%) [Table 2]. Lack of awareness (68.7%), poor digital literacy (45.2%), unreliable internet/electricity (39.8%), and preference for in-person consultations (32.5%) emerged as the predominant barriers [Table 3]. These findings are consistent with previous community-based studies from rural India that have repeatedly highlighted a persistent digital divide in telemedicine adoption [2,8,10,14]. Parameshwarappa et al. reported awareness as low as 2.2% in rural Karnataka, while similar low-utilization patterns were observed in South Indian rural cohorts [2,8]. Our observed awareness of 18.5% falls within the 2–20% range documented across multiple rural settings, indicating that northern agrarian districts like Hisar mirror the national trend of limited community penetration of eSanjeevani despite its massive national scale of over 163 million consultations [3].

The significant positive associations of awareness with younger age, higher education, male sex, smartphone ownership, and reliable internet access (Table 4) corroborate the findings of systematic reviews and mixed-method studies that identify socio-demographic and technological determinants as key drivers of telemedicine uptake [6,7,12,15]. The COVID-19 pandemic accelerated policy support and digital infrastructure, yet the same barriers—digital literacy, connectivity, and trust—continue to limit equitable access in rural populations [4,5,13]. Diagnostic concordance studies and stakeholder evaluations from western and northern states further support the clinical feasibility of telemedicine, but underscore that patient-side uptake remains suboptimal without targeted interventions [11,22].

Strengths and Limitations

Strengths of the study include its community-based design with multistage random sampling, large sample size (n=758), and use of a pre-tested questionnaire adapted from validated tools, ensuring representativeness of the rural adult population in Hisar [1,2]. Data were collected through face-to-face interviews by trained investigators, minimising selection bias.

Limitations include the cross-sectional nature of the study, which precludes establishment of causality between predictors and outcomes. Reliance on self-reported data may have introduced recall bias, particularly for utilization patterns. The study was confined to one district in Haryana, limiting generalisability to other regions of India. Finally, although operational definitions were clear, some participants might have had difficulty distinguishing between general telemedicine and the specific eSanjeevani platform.

Future Implications

The high willingness (62.4%) despite low current use signals a strong latent demand that can be harnessed through context-specific interventions. Future strategies should prioritise community awareness campaigns via ASHA workers and local media, digital literacy programmes targeting women and older adults, and infrastructure improvements (reliable internet and electricity) under the Ayushman Bharat Digital Mission [3,21]. Integration of telemedicine with existing primary health centres and National Programme for Prevention and Control of Non-Communicable Diseases (NPCDCS) services could enhance screening and follow-up for chronic conditions in rural areas. Longitudinal studies evaluating the impact of such interventions on actual utilization and health outcomes are urgently needed [16,19,20].

Conclusion

This study highlights a significant gap between the potential and actual utilization of telemedicine services in rural Hisar. While awareness and uptake remain low, the high expressed willingness indicates that targeted, multilevel interventions addressing awareness, digital literacy, and infrastructure can substantially improve access to healthcare in underserved rural communities. Strengthening eSanjeevani through community engagement and policy support is essential to realise the vision of equitable digital health under Ayushman Bharat. Such measures will not only bridge the urban-rural divide but also contribute meaningfully to universal health coverage in India.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability

Available from the corresponding author on reasonable request.

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