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RESEARCH ARTICLE

TELEMEDICINE AND TELE HEALTH CHALLENGES & SOLUTIONS IN RURAL INDIA- A SHORT COMMUNICATION

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ABSTRACT

Despite significant improvements in healthcare infrastructure over the past decades, rural India continues to face systemic challenges including workforce shortages, geographic barriers, and unequal access to quality Health care. Telemedicine and Telehealth solutions have emerged as scalable interventions to mitigate such disparities in rural India. This short communication emphasizes the implementation barriers, discusses emerging technologies, and proposes strategies to enhance, reach and impact the Telemedicine and Telehealth in rural areas.

Keywords:

Telemedicine, Telehealth, ISRO, Challenges, Rural Area.

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INTRODUCTION

Most people in India live in rural areas. Since many physicians and well-equipped hospitals and nursing facilities are in India's cities, the country's rural population does not receive enough attention when it comes to healthcare (1). The Indian Space Research Organization (ISRO) is the mainstay of telemedicine in India, having pioneered and broadened the scope of telemedicine and telehealth services in the country (2). To connect urban super specialty hospital services to rural/district hospitals via its INSAT satellites, they started with the Telemedicine Pilot Project in 2001 in collaboration with Apollo telemedicine services (3). The Indian government's Ministry of Health has recently launched several initiatives, including the National Medical College Network, the Integrated Disease Surveillance Project (IDSP)(4), the National Rural Telemedicine Network, and the OncoNET (National Cancer Network) (5). The development of telemedicine services has been greatly aided by the introduction of defined practice guidelines, the formation of a National Telemedicine Task Force, and the work of institutions like ISRO and the Ministry of Health and Family Welfare (Figure 1).

Benefits and Advantages of Telehealth on rural populations: Lessened Economic Burden & Access to Specialists: When travel and missed income are considered,

teleconsultations are substantially less expensive than in-person visits. Patients in isolated towns can now see cardiologists or oncologists without having to travel hundreds of kilometres (Figure 2). Ongoing Monitoring can be done using wearable technology with Internet of Things enables remote control of long-term conditions like diabetes and high blood pressure. The services like Tele-mental health programmes such as Tele-MANAS provide counselling and psychological support through phone and online consultations, increasing access to mental health care nationwide(6). Telemedicine services are increasingly integrated with digital health systems like ABHA (Ayushman Bharat Health Account) and electronic health records, improving continuity of care and health data management (7).

Challenges and Limitations: Insurance coverage has a significant impact on access to telemedicine services in India. The inclusion of telemedicine in insurance coverage reduces barriers for individuals, leading to improved access to specialist doctors, lower medical costs, time savings, and reduced travel expenses. While 4G/5G expansion continues, internet connectivity remains inconsistent in the "last mile" of many rural belts. Inconsistent broadband and mobile network coverage impede real-time consultations. Unreliable power supply affects telehealth delivery, particularly in remote hamlets. Lack of access to smartphones or computers curtails

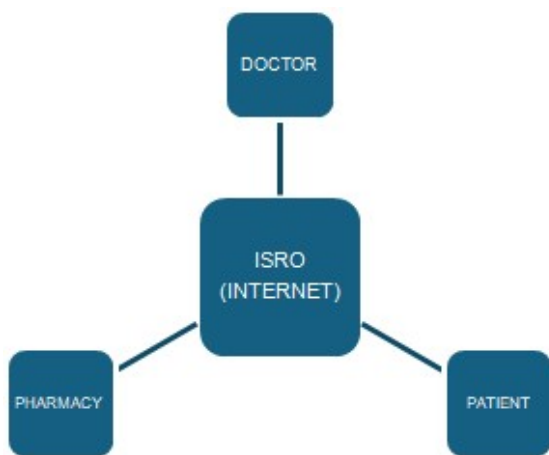


Figure 1. Diagrammatic representation of Telehealth



Figure 2. Flow diagram of Telemedicine Process

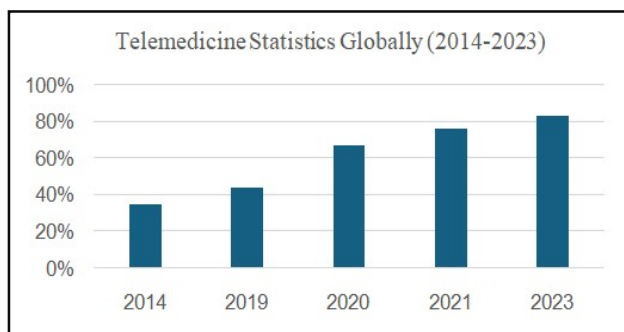


Figure 3. Showing the year wise telemedicine growth in percentage

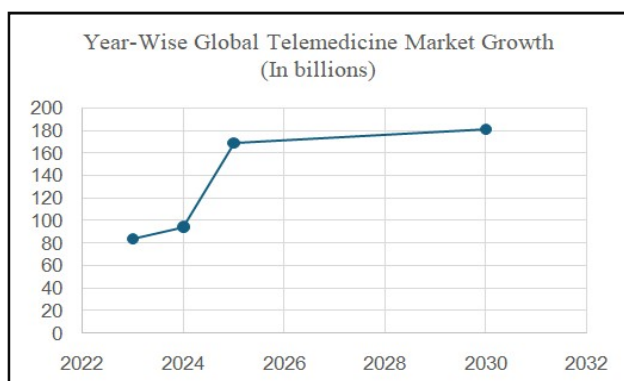


Figure 4. Showing the year wise Global Telemedicine growth in USD Billions

participation among socioeconomically disadvantaged groups. Limited knowledge on digital literacy and usability is a major barrier in Telemedicine. Patients and some healthcare workers have limited familiarity with digital platforms only a small fraction of the rural elderly can navigate digital platforms independently, often relying on community health workers (ASHAs) for assistance.

Legal, Ethical, and Privacy Considerations: Although national guidelines exist, uniform implementation across states is variable. Concerns around data security, consent, and medico-legal liability persist. Ensuring the security of sensitive health data in areas with low legal awareness remains a primary concern of their data privacy. Cultural and Behavioural Factors also act as major barriers in the transformation of health system in rural India. Preference for in-person consultations due to trust and perception of quality, social norms may limit uptake among elderly or marginalized populations, language barriers and lack of localized interfaces reduce usability.

Role in Rural and Underserved Areas: Telemedicine enables patients in urban, semi-urban and rural areas to consult doctors and specialists through online video or audio calls without needing to travel long distances. This is especially helpful for routine check-ups, follow-ups, and consultations for non-emergency issues. Some health institutions in India combine in-person and telemedicine services, offering flexibility for follow-up care and reducing hospital crowding while still ensuring necessary physical examinations when needed this process must be adopted in rural areas.

Future Trends and Developments: The telemedicine took its pace during the covid-19 pandemic. As “Necessity is the mother of invention”, Only 5% of practitioners used telemedicine to examine patients in the pre-pandemic period of 2019, which had a moderate growth rate of 44% in the five years prior. Telehealth usage increased dramatically during the 2020 pandemic surge, rising from 37% prior to COVID to 67% during the pandemic. Compared to 2019, the number of telehealth visits rose by more than 3000%. In contrast, more than 76% of doctors reported utilizing telemedicine in 2021, the time of sustained use, compared to 35% in 2014 (Figure 3). The global market value reached \$83.62 billion in 2023. 83% of consumers reported using it in the previous 12 months, while usage stayed consistent at 76%. The market expanded to an expected \$94.14 billion in 2024, with the "Services" segment which includes monitoring and teleconsulting by controlling 60.11% of the market. In 2025 The market is projected to reach over \$169 billion. Remote Patient Monitoring (RPM) is expected to double in valuation between 2024 and 2030. By 2030 The global market is projected to reach \$180.86 billion to \$380 billion depending on the reporting source (Figure 4) (9, 10). Even rural India transformed well during this phase which paved a way to successful Telehealth system through digital transformation. Now the future focus has shifted toward "phygital" a hybrid model combining physical primary care outposts with digital specialist hubs to ensure the human touch is not lost in the technological transition (8). Telemedicine adoption in India should extend to rural areas breaking the certain barriers as we discussed. Telemedicine has more benefits like it reduces the patient load on physicians. The long-term health diseases like Diabetes, Hypertension, etc can be easily followed up monthly or bimonthly through telemedicine via smart phone where

patient shares his diagnostic reports to doctor and he will receive his prescription. Now a days there are some online Pharmacy purchase platforms like Pharm Easy, Tata1mg etc., they deliver the medicine to home. It means the Telemedicine cycle from start to end is through digital communication (Figure 1).

CONCLUSION

Internet penetration in rural areas and the prevalence of smartphones among young people are examples of digital infrastructure that is growing. Using multiple high-speed satellite and terrestrial telecommunications links, resource centralization and coordination, and government support, telemedicine technology has the potential to revolutionize the field of Rural medicine. By reaching and accessing the Indian rural population, which is dispersed across diverse geographic areas, the goal of universal health can be achieved.

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