

A Systematic Review Of Appropriateness, Flexibility, Resilience, Sustainability And Productivity Of Telehealth Services In Easter India

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Abstract:

The pandemic has significantly impacted healthcare services in India, with digital health becoming increasingly popular. However, understanding the effectiveness and adoption of these services requires a thorough understanding of human behavior. A systematic review of 75 publications on telemedicine utilization in Indian healthcare services revealed high patient satisfaction, despite a shortage of person-centered care. Factors such as age, education, marital status, rural life, and disability impact usage, health literacy, and infrastructure has impact on telehealth productivity. Long-term adoption depends on healthcare personnel's behavioral characteristics and attitudes toward technology management, promoting confidence, e-Health literacy, to attain sustainability and maintaining independence and integrity.

Keywords: Digitalization, healthcare & telehealth care services, patient characteristics, multi-dimensional terrain, Sustainability

INTRODUCTION:

Significant behavioral changes have resulted from digitalization, and the most recent epidemic has further altered healthcare. Because people were secluded in their dwellings and seclusion was essential to survival, telehealth and telemedicine services gained popularity and achieve sustainability. Even though telehealth and telemedicinal services have been offered as alternative healthcare for a few decades (Kichloo et al., 2020), India is known for its diversity in terms of geography, climate, region, infrastructure, education, culture, religion, ethics, and behavior (Anthwal, Gupta, Sharma, Anthwal, & Kim, 2010). People in some parts of India lack access to adequate healthcare services because of a lack of essential infrastructure, proper exposure, trained professionals, etc., especially in the eastern parts of the country. This is because it is nearly impossible to bring uniformity to anything when there is so much diversity (Choudhari, Shaikh, Borkar, Mendhe, & Maraju, 2023). Public-private partnerships have made telehealth services available in this area; nonetheless, several limitations limit its acceptance (Rana, Tandon, & Kumar, 2023). Furthermore, it is not always clear why service providers and the public want to use telehealth and telemedicinal services (Upadhyay, Kamble, & Navare, 2023)

Long-term system maintenance without resource depletion or environmental damage is referred to as sustainability. It entails delivering quality care in the healthcare industry while taking social, economic, and environmental aspects into account. By lowering the need for transportation, fuel use, and hospital energy usage—all of which reduce carbon emissions—telehealth plays a critical role in improving sustainability. (Purohit et al., 2021) Additionally, it expands healthcare access, especially in remote regions, saves time for patients and clinicians, and improves cost efficiency by lowering operating expenses. By improving

healthcare delivery and reducing hospital overcrowding, telehealth can free up healthcare professionals to concentrate on urgent situations (Hoffman, 2020), Telehealth increases productivity for healthcare workers by providing flexible scheduling, lowering burnout, and optimising workflows. Additionally, it improves flexibility, which frees physicians from the limitations of premises to reach more patients (*Improving Outpatient Nurse Satisfaction and Productivity Using a Hybrid Teleworking Model - ProQuest*, 2023). All things considered, telemedicine is an effective, long-term option that helps patients and healthcare professionals alike, lowering environmental impact while enhancing patient outcomes.

There has not been a thorough analysis of these services' efficacy and usage yet. Therefore, it is necessary to conduct a thorough investigation of the behavioral changes that are occurring or necessary in human nature. There are not many studies that compare telehealth care services to in-patient visits to show their superiority (Wood et al., 2021) or assess their viability and acceptability (Suryavanshi et al., 2020). Either the telehealth strategy and its many features will be accepted in the future (Bunnell, Barrera, Paige, Turner, & Welch, 2020) or its various components will open a new path to success in India's digitalization (Taneja, & Sushil, 2007). The researchers sought to determine what barriers existed and how helpful this intervention was. In 2019, Nimmagadda et al. Numerous e-government telehealth care services were assessed to gauge adaptability in addition to the aid of digitization (Kamble, Navarre, and Upadhyay, 2023). Scholars have endeavoured to ascertain the kind of e-health initiatives that the Indian government has implemented, in addition to the numerous challenges they have faced and the financial consideration. In 2014, Jarosławski and Sabbarwal Scholars were eager to find out how this technological innovation was progressing now (Maroju, Choudhari, Shaikh, Borkar, & Mendhe, 2023). Scholars have tried to study its historical viewpoint, usage, limitations, and other restraints in the Indian setting (TPandve, Gaikwad, Bhure, & Kadam, 2022).

They tried to examine its economic, social, technical, and other demographic traits (Bhatia Ridhi, 2021). The worldwide telemedicine strategy was evaluated in relation to national economic concerns, international cooperation, commercial involvement, and regulatory frameworks (Shalomiyan & Avanesova, 2019). Nonetheless, they summarise and analyzed the moral, legal, and sociological concerns driving the healthcare industry's digitalization (Bonnie Kaplan, 2019). The characteristics of health care professionals were evaluated to determine the rate of adoption of this new technology (Bunnell, Barrera, Paige, Turner, & Welch 2020). They also tried to identify some important provider characteristics that might aid in improving the mental and physical behavior of their clients, and they even put forth a conceptual model for this improvement. service (Elouadi, Hamdoune, & Rouidi, 2022; Kim and Han, 2023).

To find any inconsistencies, the adaptability of clinical practitioners was examined by addressing both technical and interpersonal factors (Alan Miller, 2003) and verifying their eagerness to apply clinical practice (Gagnon et al., 2003; Xue et al., 2015). However, several studies also evaluated health personnel' expertise, perceptions of the facility, and digital proficiency (García- Gutiérrez et al., 2023). To satisfy their wish to improve the system to address the unmet need for telemedicine, they evaluated medical professionals and doctors. (Verma, Acharya, Lehmann, Alam, and Yazdi, 2023) They find out what nurses think about telemedicine (Sharma & Clarke, 2014). To better grasp their perspectives, postgraduate medical students' impressions were also analyzed (Dey & Bhattacharya, 2016). It was evident that doctors' thoughts on the feasibility and efficacy of telemedicine for first aid needed to be investigated. (Fang and others, 2022). They also look at the characteristics that encourage physicians to adopt telemedicine as well as the opportunities and problems that come with it (Onsongo, Kamocho, Rinke de Wit & Lowrie, 2023).

However, to determine their degree of acceptability, patient characteristics were also assessed (Lawson et al., 2020). (Pongiglione, Compagni, Mazziotti, Angelucci, & Carrone, 2023) Determining a patient's acceptance requires evaluating their level of satisfaction. Their acceptance is also assessed in relation to their experiences, avoidance motivations, and different infrastructural barriers (Raj et al., 2022). (Nguyen and others, 2022). However, in the midst of a worldwide pandemic, many behavioral viewpoints about the need of prophylactic

measures were examined (Baudier, Ammi, & Kondrateva, 2021). They also made an effort to investigate how widely used technology may help and enhance the patient's capacity to manage and preserve their independence. In 2016, Vatnøy, Thygesen, and Dale Researchers also look at the internal and environmental elements that affect a person's desire to modify their online consultation habit (Goyal, Chauhan, & Gupta, 2021). They examine how the view of telemedicine has evolved via the prism of online consumer culture. In 2023, Gaitán and Ramírez-Correa. Researchers examined the use of outpatient eSanjeevani Telemedicine Services by gender, age, urban-rural split, organ-system involvement, kind of OPD service provided, and prescription analysis because the Indian government had just implemented a few e-healthcare platforms during COVID-19. (Guleria, Dinesh, Patiyal, Negi, and Kanwar, 2020)

To be sustainable in India, social justice, economic progress, and environmental preservation must all be balanced while considering the difficulties faced by the nation (Leal Filho et al., 2019). India's vast population and quick expansion put strain on its infrastructure, social structures, and natural resources. Given the nation's problems with waste management, water scarcity, and air pollution, environmental sustainability is a top priority (Mondal & Palit, 2022). The goal of initiatives like the promotion of solar power and renewable energy is to lessen these problems. India's economy is centred on inclusive growth, with initiatives designed to fight poverty, enhance education, and provide employment—particularly in rural areas—through sustainable agriculture and conscientious industrial expansion (Sen & Ganguly, 2017). To resolve the differences between rural and urban people, social sustainability places a strong emphasis on fair access to resources and services. India's sustainable growth depends on telehealth since it makes healthcare more accessible, particularly in rural regions (Barjis et al., 2013). By eliminating the need for travel, it lowers carbon emissions and saves money and time. Telehealth facilitates effective healthcare delivery, guarantees ongoing monitoring of chronic illnesses, and relieves hospital strain. It optimises resource utilisation, improves healthcare accessibility, and supports environmental sustainability by providing remote consultations (Vallée & Arutkin, 2024).

However, outside of India, research was conducted on the traits that influence e-health literacy and behavioral intention to utilize telehealth services in a disadvantaged demographic (the Hispanic community). (Ghaddar, Alvarado Vatcheva, and Mykyta, 2020) Characteristics of telehealth users and non-users were examined in rural areas (Brunner et al., 2023). Additionally, a comparison was made with people who had previously used social media in telemedicine and health services. (Liu and Gong, 2023). Furthermore, it is uncertain if home-bound care will become the norm for all chronic patients or whether these modalities would improve family accessibility because the epidemic has split everyone apart. (Tsami and others, 2022). The use of these technologies and the development of applications based on mental health are being investigated in several medical research fields to evaluate their possible benefits and challenges. In 2017, Langarizadeh et al. (Lawson D. and others, 2022). To identify a neurological condition such as epilepsy, adaptability and need were investigated (Kissani et al., 2020). One of the most vulnerable groups, the elderly, was evaluated. for feasibility, economic benefits, acceptance, and effectiveness (Zhang, Pin Leuk, & Teo, 2023). Glycaemic control management and the viability and effectiveness of a mobile health and task cooperation strategy were investigated for another co-morbid group (diabetes type 2). (Dandge, Jeemon, & Reddy, 2019); (Anjana et al., 2020) During the pandemic, cell phones were used to evaluate patients with chronic obstructive pulmonary disease (COPD) for home-bound rehabilitative therapy. In 2021, Bairapareddy et al. Researchers expressed hope for the cardiothoracic surgical community in terms of filling up the gaps in healthcare research, education, outreach, and perioperative therapy (Doddaman & Kumar, 2023). Field research in ophthalmology was carried out to investigate the acceptability of AI-based retina screening. To evaluate adaptation, diagnostic treatment aid routes and tailored help programs were employed (Shah, Misra, Shanmugam, Vighnesh, & Jayaraj 2022). (Zuccotti, Foppiani, & Calcaterra, 2023) According to Sarah M. et al. (2020), even the physical therapy sessions were evaluated.

According to Singh, Sarbadhikari, Nath, Anil G., & Oommen (2022), basic primary care in India will either be quickly adapted to the country or there will be considerations for future adaptation for long-term success (Bradford, Caffery, & Smith, 2016).

PROBLEM IDENTIFICATION:

Most of the study was carried out while pandemics were plaguing the planet. (Shah, Misra, Vighnesh, Shanmugam, & Jayaraj, 2022).and more research is desperately needed to understand its potential in the future. In 2017, Langarizadeh et al. Despite living in a non- pandemic period, people may investigate its advantages, rationale, and effectiveness in several medical study fields (Rajkumar et al., 2023). Comparing telemedicine to other modern healthcare delivery techniques requires multicentric study. (Raj and others, 2022). For the general population to readily adopt this new technology, medical experts, doctors, and other authorities must now work together with telemedicine technology. (Tu and others, 2023).

Furthermore, because telemedicine's long-term viability and integration into healthcare systems are essential to its ongoing success, researchers are becoming increasingly concerned about the sustainability of telehealth itself (Bagot et al., 2018). Telehealth must be able to function successfully and efficiently throughout time, adjusting to shifts in patient demands, healthcare regulations, and technology. This entails tackling issues like guaranteeing dependable access to digital infrastructure, getting past obstacles to patient and healthcare provider acceptance, and upholding high standards of care. Evaluating telehealth sustainability also entails assessing its cost-effectiveness, environmental impact, and capacity to lessen healthcare inequities, particularly in underserved or rural areas (Oye & Jameson, 2023). To become a vital component of healthcare systems, telehealth must be not only effective and accessible but also flexible and scalable, with continuous research directing its development to satisfy the demands of a populace that is expanding and becoming more varied.

However, it is also true that we must acknowledge that there will never be a single solution that works for everyone in the complex landscape of a unique economic, educational, and cultural setting. (Deb, and others, 2018) People from various places may feel quite differently about the remote first aid system due to cultural variations, language interpretation issues, comprehension difficulties, and information omissions. (Fang and others, 2022). Researchers did, however, ask that the areas where further telehealth services are required be noted. (Ridhi Bhatia, 2021) because the hard-to-reach location may produce more false reports. (Saikat and Soumitra, 2021). There have not been many studies done in a disadvantaged, rural population with few medical services (Brunner, et. al., 2023; Butzner & Cuffee, 2021). A study reveals significant differences in healthcare quality and accessibility across different districts in West Bengal, with the northern and western areas being the most undeveloped. These districts, comprising 28.63% of the region, are home to 17.96 million people suffering from inadequate healthcare. (Majumder et al.2022) It was discovered that the demand for public health facilities is much higher than that of private health facilities in rural areas of a few districts in North Bengal. Additionally, the rural population, which typically has fewer healthcare facilities in their local community, is more likely to use modern sources of care in the town. (Majumder, 2006) Even in the eastern India, to commission 72 telemedicine nodes in Assam and other northern states, including Sikkim, the ISRO-NEC telemedicine project was started in 2004. With the use of contemporary technology, the initiative seeks to link district-level hospitals with specialty hospitals to provide better treatment at the lowest possible cost. (Saikia.B,2020) To comprehend its future development, a detailed analysis of the emotions and sentiments of eastern Indian consumers is necessary and this need to be accomplished with a bigger sample size, more exacting designs, sufficient reporting, and outcomes and procedures that are more precisely specified. (Zhang, Teo, and Pin Leuk, 2023), Therefore, the main goal of the study is to summarize current information by reviewing analysing, and synthesizing study data.

The factors impacting the adoption and use of telemedicine technology have received very little attention in the literature. (Elouadi, Hamdoune, & Rouidi, 2022). To ascertain the adoption of telehealth technology, most

of the data was collected during a pandemic, making it impossible to draw firm conclusions. Nevertheless, a review of the impacts and responses to telehealth is necessary to find new care gaps that may influence service utilization equity (Farrer, et al., 2023). In 2023, Gaitán and Ramírez-Correa It was discovered that the study focused more on the self-reported views of medical students and doctors toward telemedicine topics than on actual practice. (Gutiérrez-García et al., 2023) Despite conflicting results, researchers discovered that considering physicians' self-perception as telemedicine users improved the prediction of their utilization. (Gagnon and others, 2003) Additionally, because only clinical individuals were selected, bias exists (Onsongo, Rinke de Wit, Kamotho, & Lowrie, 2023). Therefore, further study is required to educate doctors and encourage them to discuss visitation strategies to provide high-quality care that addresses patients' needs and circumstances. (Nguyen and others, 2022).

To find out how patients feel about tele healthcare services, further research on patient input should be done. (Guleria, Dinesh, Patiyl, Negi, and Kanwar, 2020) because people's behavioral desire to use technology in their homes cannot be explained by the research. Gong and Liu (2023) Budgetary issues for telehealth services, especially in poor regions, were speculative due to the unclear nature of the technology, and even behavioral aims were not well defined. (Vatcheva, Alvarado, Ghaddar, & Mykita, 2020) Every facet of trusting beliefs needs to be looked at separately. (Ammi, Kondrateva, & Baudier, 2021). Undiscovered beliefs should be investigated to give emotive and useful values for digital health services. (Kim and Han, 2023) Thus, describing the behavioral characteristics of user intention is another objective of the study.

PROBLEM STATEMENT & OBJECTIVE

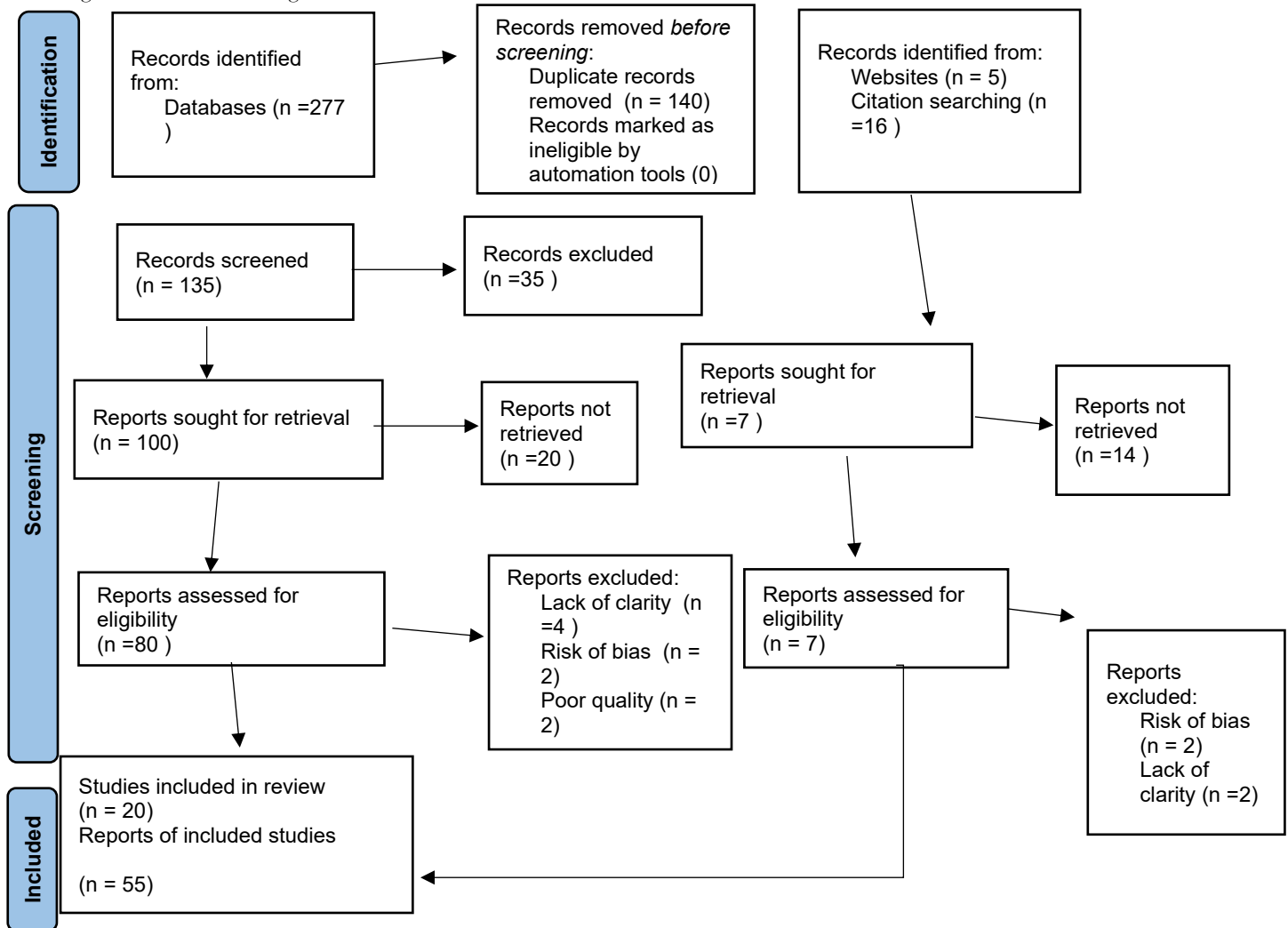
The future of telemedicine in Eastern India hinges on several factors, including patient selection, workflow integration, perceived utility, regulatory issues, and equipment costs. A small sample size in current studies is insufficient to accurately assess users' behavioral intentions toward adopting technology. This study aims to summarize existing information, understand user intentions, and explore the implementation of telehealth services in Eastern India. Additionally, it seeks to achieve sustainability in telehealth services, ensuring their long-term viability and effectiveness in the region.

METHODOLOGY

To offer a comprehensive and comparative approach to critically analysing the body of available literature, a systematic review technique was employed. For this investigation, the PUBMED and Google Scholar databases were searched. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards were followed for conducting the searches. Initially a total of 277 papers were produced by combining the topic terms "accessibility," "adaptability," and "effectiveness and uses" with "telemedicine" and "telehealth" in various database searches with any design and in any setting. Which includes relevant abstracts, articles, book chapters, conference papers, and reviews, published between 2005 and 2023. Later, the elimination of duplicates, the initial 277 records discovered were reduced to 140, after that during the article screening process, an additional rigorous inclusion criterion was established to evaluate only records that focused on the accessibility, adaptability, and efficacy of telehealth services in various regions of India. 100 full-text articles were accepted for eligibility and evaluated to identify the primary research, even after that, 25 studies were removed due to lack of clarity, and poor quality, Therefore the final body of literature included 75 articles(fig.1)

The importance of each paper in relation to the problem of telemedicine use in Indian healthcare services was evaluated. The following data domains were extracted from each research's data once it was retrieved and assembled into Microsoft Excel spreadsheets: study title, author details, problem, aim, findings, and limitations. Important data was taken out of each article. The collected material is compared, contrasted, and presented in a meaningful way as themes in a narrative synthesis.

Figure 1: PRISMA diagram



RESULTS

Fig -2 demonstrates the distribution of articles, since before the covid era (2005-2019), just a tiny number of articles a substantial increase was noticed after COVID-19. That shows teleconsultation has gained acceptance during the pandemic for confidentiality, communication, and medication management. However, challenges remain in providing optimal treatment

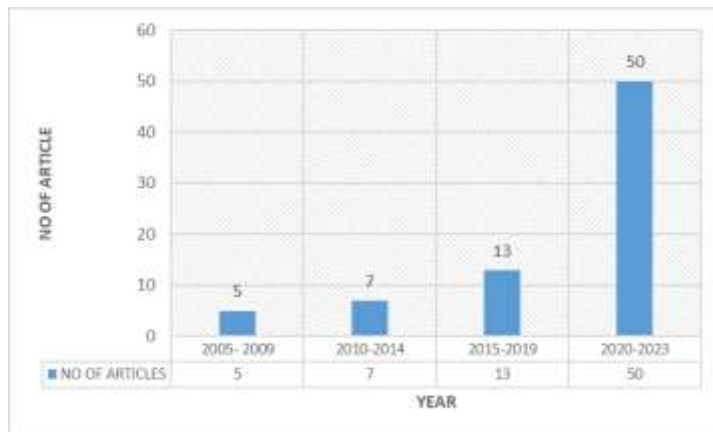
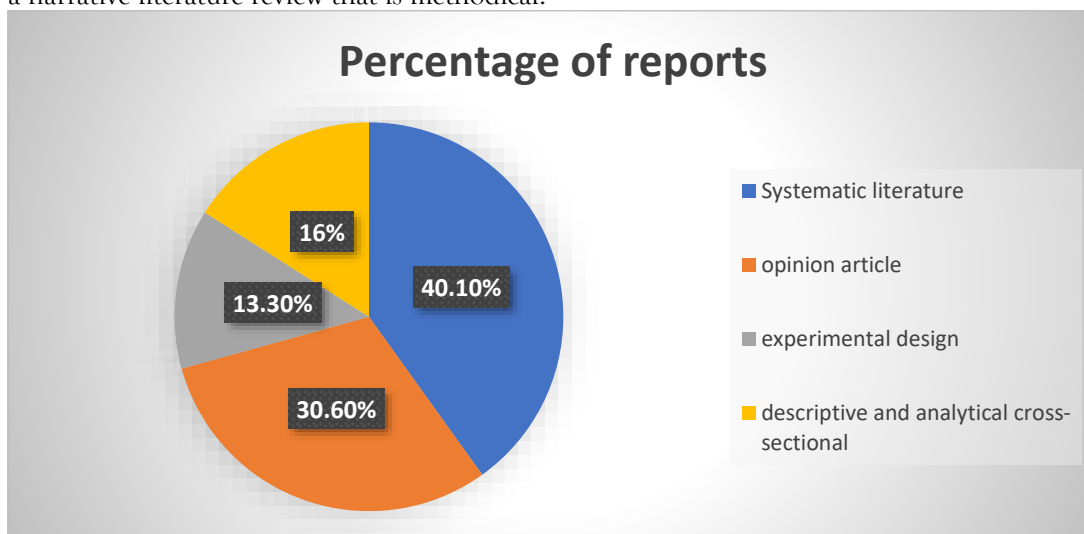


Fig 3 shows, more than 30.6% (23/75) of the 75 articles were opinion pieces, and 16% (12/75) were descriptive and analytical cross-sectional research. Less than 13.3% (10/75) used an experimental design that made it possible to assess how interventions affected the results in terms of health. The remaining research is a narrative literature review that is methodical.



Most of the studies of telemedicine were conducted in southern & north Indian states, with no articles published from Jammu and Kashmir and north east states and a very few from eastern India (like from West Bengal (3/75) and from Jharkhand (1/75)

Numerous writers attempted to examine the literature about the application of telemedicine in the treatment of illnesses, such as stroke disorder, (Zheng et al., 2023), autism in children, (Lee et al., 2021) and mental health treatments (Damodharan et al., 2021) (Agarwal et al., 2020) aging care, (Bhatia, 2021) AI-based screening to improve eye health awareness, and treatment strategy for NCD diseases are mostly focused in studies (Spits et al., 2022). The report indicates that telemedicine programmes in India are limited to providing remote consultations and do not provide comprehensive, person-centered care. However, post-epidemic teleconsultation services have shown high patient satisfaction and have the potential to improve primary healthcare beyond COVID-19 by transforming medical practices without displacing in-person patient visits.

Health Professionals

Patients have been the subject of the most research (26 papers), followed by healthcare professionals (17 articles). A few research examine this complex phenomenon from the viewpoints of patients and medical

professionals. The health professional was the focus of roughly 22.0% (17/75) of the papers, which pointed at the health system. The most popular methods for strengthening the health workforce were developing skills, remote training, and teleconsultations, which established a network of contact between providers. Through lower expenses, better use of resources, and enhanced physician recruitment and retention, this also helps rural communities. Additionally, home-based care and monitoring have enhanced healthcare, which has raised the need for telemedicine tactics.

However, seven articles look at how providers deal with legislative fragmentation, data privacy, security, and compensation. They also encounter opposition because of perceived threat and controllability. Four papers looked at the creation and efficacy of community health worker-focused interventions that allowed task shifting for disease screening, referral, and health information delivery.

Service delivery

Strengthening service delivery was the main topic of around 61.3% (46/75) of the initial study publications. Videoconferencing follow-up, remote diagnosis, and patient consultations were among the main tasks addressed. Alerts for appointments, behaviour modification messages and treatment adherence (text and IVR) were the main uses of mobile phones.

In contrast, the process of developing patient satisfaction was described in nine articles. Regarding population acceptance and rising usage with age, education, marital status, rural life, and disability, two articles made comments. It implies that since COVID-19 has an emotional impact, non-technological aspects like the attitudes of patients and healthcare practitioners will determine telemedicine's long-term acceptability and efficacy in healthcare systems. An attitude towards technology management promotes independence, integrity, and trust while reducing stress. The impact of attitude on eHealth literacy is significant. Patients encounter difficulties because of low computer proficiency, unethical behaviour, low education, and language obstacles when telemedicine awareness is minimal. Major factors also include patient desire, language, health literacy, sickness progression, and technological accessibility.

Essential Adaptation

Out of all the papers, 24% (18 out of 75) assessed how to increase the teleconsultation system's long-term adoption while putting an emphasis on non-technology factors like patient attitudes and medical professionals. Most of the articles dealt with attitudes towards technology management, independence, trust-building, and the integrity of eHealth literacy. Out of the 75 selected articles, 16% (12) focused on the primary challenges arising from low education, computer literacy, language barriers, and unethical behaviour. Almost half of the articles discussed patient preference, user fear, family involvement, and the use of remotely operated technological tools for disease diagnosis. The establishment of better internet utilisation increases the trust of patients and cost savings.

Users fear telehealth disruptions, even though family cohesion and participation are associated with higher levels of engagement. Indians are opening to telemedicine more and more because to expert training, clear procedures, and excellent internet networks. Digital health adoption is impacted by its usability, assurance, cost, and practicality. Telehealth technology adoption is more common among doctors who have social and professional responsibilities, but providers must deal with issues including legislative fragmentation, data privacy and security, and pay. They encounter opposition because of perceived control and threat.

Government policies, financing, and infrastructure

Six studies in all focused-on issues connected to financing, governance, and infrastructure. The main goals of these studies were to identify the difficulties in funding the current mHealth programmes and the legal concerns surrounding teleconsultations, flawed guidelines, a diverse population, and uneven resources. in India (Scott & Mars, 2015).

The Indian government embraces telemedicine but faces challenges like flawed guidelines, a diverse population, and uneven resources. Government policies, literacy, and infrastructure are crucial for successful

integration Expanding telehealth services in rural areas requires scaling up and duplicating effective services, focusing on vision, ownership, adaptation, economics, efficiency, and equipment. Addressing technology constraints, staff shortages, and financial sustainability concerns requires training, change management, and alternating telemedicine and human-patient engagement. Research advances digital adaptability skills, and the digital assistant model enhances telemedicine quality and resource efficiency. Ethical standards for telemedicine require context-sensitive evidence for decision-making.

the ESG (Environmental, Social, and Governance) elements are playing a bigger role in forming the telehealth industry in India. Environmental In India, telehealth lessens the need for travel, which lowers carbon emissions, particularly in rural areas with limited access to healthcare. By lowering traffic and emissions linked to mobility, telehealth provides a sustainable answer to India's expanding population and rising pollution levels. Socially Telehealth could help close the large gap in healthcare access between India's rural and urban areas. It helps reduce gaps in health outcomes, improve healthcare accessibility and affordability, and deliver necessary medical services to rural places. Additionally, telehealth platforms are striving towards diversity by supporting regional requirements and providing services in many languages. In terms of governance, telehealth providers in India are required to go by rules such as the Ministry of Health and Family Welfare's Telemedicine Practice Guidelines, which guarantee the confidentiality of patient information and the ethical delivery of services. These platforms must also follow ethical guidelines for patient care and billing, and they must be open and honest about their pricing and business procedures. Telehealth in India can improve access to healthcare, promote sustainable healthcare practices, and have a good social impact by adhering to ESG principles. This will benefit disadvantaged people as well as the environment.

DISCUSSION

Telemedicine, a combination of telecommunications and medicine, is a remote healthcare delivery method that has evolved significantly since its inception in the mid-20th century. It involves remote practitioners providing services through a telecommunications system, often using desktop computers for data storage. The patient receives the service through a telecommunications network, often with the help of a tele presenter. Telemedicine has transformed healthcare delivery across various domains, including primary care, specialty consultations, mental health services, and remote monitoring. The COVID-19 pandemic has accelerated the acceptance of telemedicine to deliver prompt, accessible healthcare while reducing in-person interactions.

Telemedicine has several applications, including treating chronic illnesses, providing virtual follow-ups, ensuring no missed prescriptions, and enhancing patient care. It has also been instrumental in reducing hospital stays and reducing the number of missed prescriptions. Telemedicine has also been instrumental in reducing the number of hospitalizations and, thereby improving patient outcomes.

Telemedicine applications offer numerous benefits to patients and doctors, including remote health check-ups, improved communication, and lower travel costs. They also extend to mental health services and provide access to care in rural areas or after natural disasters. Technological advancements like high-speed internet, smartphones, wearables, and artificial intelligence have enhanced the capabilities of telemedicine, enabling data-driven decision-making and personalized healthcare. However, challenges such as data security, regulatory frameworks, digital access disparities, and concerns about remote care quality remain. The future of telemedicine is promising, with the convergence of telemedicine with emerging technologies like virtual reality, blockchain, and 5G. Telemedicine's major application areas include dermatology, radiology, and tele nephrology. Tele dermatology uses telecommunications to help patients and dermatologists communicate, while radiology transfers radiological scans or images between locations, reducing waiting times and expenses. Tele nephrology focuses on treating chronic kidney disorders, which are often delayed due to a shortage of nephrologists. Understanding patient perspectives is crucial for evaluating the success of telemedicine.

Tele neurology, telepsychiatry, and tele pharmacy are all telemedicine applications that use email and video

conferencing to connect patients with specialists in various fields. Tele neurology has been particularly beneficial for stroke victims, offering expedited treatment and reduced hospital stays. Medical specialities such as telepsychiatry, telepathology, and tele pharmacy employ video conferencing to diagnose, treat, and administer therapy to patients remotely. While tele pharmacy provides remote counselling, dispensing, and inpatient treatments, telepathology uses electronic links to enable remote pathology. However, ethical questions of patient privacy, informed permission, and responsible technology usage are brought up by the incorporation of telemedicine. Patients' ignorance of who will manage their medical records and the possibility of security breaches are privacy concerns.

By decreasing travel requirements, lowering medical expenses, and enhancing access to care—especially in underprivileged or rural areas—telemedicine presents a substantial opportunity for sustainability in healthcare. Research conducted both before and after the pandemic has demonstrated that telemedicine can minimise hospital visits, improve care continuity during emergencies, and cut carbon emissions by doing away with the need to travel for consultations. Additionally, by reducing hospital stays and enabling remote chronic illness management, it lowers healthcare expenses. But there are also issues like unequal access to digital resources, worries about data security, and the effects of digital infrastructure on the environment.

The necessity of efforts and durable digital infrastructure to guarantee fair access to telemedicine has been the subject of more recent studies, especially considering the COVID-19 pandemic. Telemedicine's quick rise to prominence as a major healthcare delivery method during the epidemic brought to light both its advantages and disadvantages. This increase made it clear how urgent it is to solve problems like the digital divide, which occurs when underprivileged groups, particularly those living in rural or low-income areas, lack the technology or internet connection needed to take advantage of remote healthcare services. Concerns have also been raised regarding the sustainability of the infrastructure enabling telemedicine, especially the energy consumption of data centres and the environmental impact of maintaining these systems, because of the rising reliance on digital platforms for healthcare. Before the pandemic, most of the research focused on the financial advantages of telemedicine, including lower travel expenses, fewer in-person consultations, and improved healthcare effectiveness. Another major emphasis was accessibility, with telemedicine being viewed as a means of increasing underprivileged communities' access to healthcare. However, the pandemic's quick transition to telehealth highlighted the need for a more inclusive and sustainable strategy that not only guarantees wider access but also gives telemedicine's social and environmental issues top priority. Future initiatives must focus on improving digital infrastructure, expanding internet access in underserved areas, strengthening data security protocols, and reducing the environmental impact of telemedicine platforms to ensure the long-term social, economic, and environmental sustainability of telemedicine. In the rapidly changing healthcare scene, these steps are essential to ensuring that telemedicine is a sustainable and equitable option.

Different patients may adopt new software and equipment differently because of variances in access to technology, which can worsen issues with healthcare equity and access. The benefits and drawbacks of telemedicine, which can improve patient experiences by facilitating faster second opinions, can be assessed using an evidence-based methodology. Among the benefits are teleradiology, tele mental health, telecardiology, home telecare, and tele dermatology; nevertheless, further study is necessary to realise its full potential.

By transforming medical procedures without taking the place of in-person patient visits, telemedicine has the potential to enhance primary healthcare beyond COVID-19. During the epidemic, it has been more widely accepted for communication, drug administration, and secrecy. Nonetheless, there are still difficulties in delivering the best care. Telemedicine services in India do not provide full person-centre treatment; they just provide remote consultations. Teleconsultation services had great patient satisfaction after the outbreak, and rural towns benefited from lower costs, better use of resources, and better physician recruitment and retention. Additionally, home-based care and monitoring have enhanced healthcare, which has raised the need for

telemedicine tactics. COVID-19 affects social media consumer behavior, health systems, telemedicine, and emotions. The use of telehealth rises with age, education, married status, living in a rural area, and handicap. However, non-technological factors like healthcare professionals and patients are crucial for long-term acceptance and effectiveness. Attitudes toward technology management lower stress and foster honesty, independence, and trust. Despite the low level of telemedicine awareness, attitudes have a big influence on eHealth literacy. Low levels of knowledge, computer literacy, language hurdles, and unethical behavior provide difficulties for patients. Other factors include patient preference, language, health literacy, technology availability, and the course of the illness. Users dread telehealth disruptions, while family cohesion and participation are associated with higher engagement. Telemedicine is becoming more and more popular in India thanks to professional training, well-defined policies, and reliable internet networks. Convenience, informational value, cost savings, trust, and usefulness are all factors in the acceptability of digital health. Medical professionals who have social and professional responsibilities are more likely to use telehealth technologies. But in addition to dealing with issues of data privacy, security, compensation, and regulatory fragmentation, providers may encounter opposition because of perceived threats and controllability. Telemedicine has helped postgraduate medical students, however there are still obstacles to overcome, such as technological difficulties, ethical dilemmas, and application issues. Telehealth presents opportunities for innovation and adaptation that might lead to better functional results, training for physical therapists, and patient care. A rise in the demand for telehealth services suggests flexibility and future potential.

There are differences in telehealth knowledge and use throughout the world, with Asian Indians placing a lower value on telemedicine services. Telehealth services provide scalable and flexible alternatives for the public, even in the face of government resistance and possible collaboration issues. By reducing the distance between patients and medical experts, telemedicine in India has the potential to enhance primary care and universal health coverage. Electronic health records, physician education, supply chain management, and eHealth policy are all part of implementation.

Telemedicine bridges the healthcare gap between rural and urban areas, improves palliative care, early detection, cancer treatment, and prevention, and boosts primary care physician consultations. India's limited resources present enormous opportunities for investing in children's health, aged care, and technology-based mental health therapies. While parent- implemented functional analyses and communication training lessen autistic behavior, AI- based screening raises awareness of eye health issues. The availability of services, integration into the home, and self-confidence of stroke survivors are all improved by telerehabilitation. Despite obstacles such as inconsistent resources, a varied population, and faulty regulations, the Indian government welcomes telemedicine. Infrastructure, literacy, and government policies are essential for effective integration. Scaling up and replicating successful services while concentrating on vision, ownership, adaptability, economics, efficiency, and equipment are necessary to expand telehealth services in remote regions. Training, change management, and alternating telemedicine and human-patient involvement are necessary to address technological limitations, personnel shortages, and financial sustainability issues. The digital assistant model improves the quality and resource efficiency of telemedicine, while research promotes digital adaptation abilities. Context-sensitive evidence is necessary for decision- making in accordance with telemedicine ethical norms.

FINDINGS & CONCLUSION

Despite the absence of comprehensive person-centered care, post-epidemic teleconsultation services achieved high patient satisfaction rates throughout India. Its usage is enhanced by age, education, marital status, rural residence, and disability. Although family cohesiveness and involvement are associated with increased engagement, users are worried about telehealth interruptions. For integration to be successful, infrastructural development, health literacy, and government policies are essential. However, from the standpoint of Eastern

India, patients' and healthcare providers' attitudes and behavioral traits determine long-term acceptance and efficacy. Attitudes toward technology management foster trust, which influences e-Health literacy and reduces stress while maintaining autonomy and moral character. The introduction of the first medical information system software in 1996 marked the beginning of India's telemedicine development.

The significance of health as a condition of whole physical, mental, and social well-being is emphasised by the World Health Organisation (WHO). However, with 68.84% of the population residing in rural regions, access to India's healthcare system is severely unequal. The idea of telemedicine, which uses technology to deliver medical care remotely, has become more popular in recent years. Through text, audio, and video transmission, telemedicine provides teleconsultation, telediagnosis, telemonitoring, and telerehabilitation. Its usage to reduce physical contact and ease the strain on healthcare facilities has surged due to the COVID-19 epidemic. India offers special chances and difficulties for the uptake and application of telemedicine. Geographical limitations, a lack of medical professionals, and the rising need for specialised treatments are some of the problems it can solve. Effective telemedicine deployment, however, requires addressing issues including legislation, data protection, infrastructural constraints, digital literacy, and reimbursement structures. Telemedicine can improve healthcare outcomes in India and close gaps in healthcare accessibility by tackling these issues and seizing opportunities.

Implication of study:

Policy Implications: Telehealth services in Eastern India need tailored policies that enhance their appropriateness for diverse populations, particularly in rural and underserved areas. Policymakers should focus on improving infrastructure and providing financial incentives for healthcare providers to adopt telehealth technologies. These policies should also address the need for culturally sensitive care, considering regional differences, and integrate telehealth into public health systems to ensure its long-term sustainability.

Societal Implications: The adoption of telehealth in Eastern India could significantly improve healthcare access, especially in remote areas with limited healthcare facilities. It enhances flexibility by allowing patients to receive care without extensive travel, benefiting rural and marginalized communities. Telehealth also contributes to greater resilience in the healthcare system, enabling continuous care during emergencies or natural disasters, ensuring communities are not cut off from essential services.

Theoretical Implications: Telehealth services in Eastern India should be viewed through the lens of systems theory, where they serve as a dynamic, adaptive component of the healthcare system. Future research should explore how telehealth integrates with traditional care models and how it can evolve to meet the region's specific healthcare needs. The role of telehealth in improving healthcare delivery flexibility and resilience should be further investigated to optimize its long-term impact.

Practical Implications: The practical implementation of telehealth in Eastern India requires investment in training healthcare providers to effectively use digital tools, overcoming challenges such as limited technological literacy. It is essential to establish reliable internet infrastructure to ensure seamless service delivery. Additionally, healthcare providers need to create patient-centered approaches, ensuring that telehealth consultations are effective, accessible, and meet the region's healthcare needs.

Methodological Implications: Future studies should focus on assessing the appropriateness, sustainability, and productivity of telehealth services in Eastern India through both qualitative and quantitative methods. A comprehensive evaluation framework should be developed to measure patient satisfaction, healthcare outcomes, and operational efficiency, ensuring that telehealth services remain effective and adaptable to the evolving healthcare landscape. Additionally, research should explore how telehealth can be optimized to overcome barriers to access, such as digital illiteracy and inadequate infrastructure.

Limitation

It is imperative to address a few of this review's shortcomings in closing. First off, the number of databases from which we could incorporate studies was restricted to five. To stay current with the most recent pandemic advances, more study is required because the topic is complex and recent. Subsequent investigations must to concentrate on the acceptance and use of telemedicine by susceptible and marginalised groups, such as those residing in isolated and rural areas.

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