





## Original Research Article

# Perception of telemedicine and eHealth technology for cancer care in north east India: A survey in Arunachal Pradesh

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## ABSTRACT

**Introduction:** The epidemiological burden of cancer is higher in the North Eastern region than other part of India. Papumpare register in Arunachal Pradesh has the highest age-adjusted rate of female cancer and the second highest rate of male cancer among all Indian registers. Arunachal Pradesh has only one tertiary care facility, and most cancer patients are sent to other states for treatment.

**Objectives:** The purpose of this study was to determine the scope of Telemedicine and people's perceptions on the use of digital health services.

**Materials and Methods:** Data from secondary sources and an online survey with 565 responses were analysed.

**Results:** More than half of the respondents have a favourable attitude toward digital health, use of internet services, and trust in telemedicine.

**Conclusion:** Improving digital infrastructure and raising public knowledge about the use of eHealth services is a pressing need. Telemedicine has the potential to improve the health-care system in the north-eastern area by reducing outward migration and lowering the economic cost of treatment.

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## 1. Introduction

Arunachal Pradesh is a federal Indian state with a population of around 1.4 million people. It is a mountainous state in the eastern Himalayas. The state's population is primarily tribal, with 78 percent belonging to Schedule tribes.<sup>1</sup> The north-eastern region's public health infrastructure has long been viewed as a difficulty, and a technological intervention policy has been proposed to sever the bigger population. Physical infrastructure such as hospitals, beds, equipment, and human resources, as well as digital infrastructure, have been identified as difficulties in the region.

The state's alarming cancer status in the Papumpare population-based cancer registry (ICMR, 2020) and restricted cancer care services necessitated quick innovation

and cost-effective service solutions. This study attempted to analyze the existing situation and make recommendations for the future scope of telemedicine.

The World Health Organization (WHO) defines telemedicine as "the delivery of health-care services, where distance is a critical factor, by all health-care professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and the continuing education of health-care workers, with the aim of advancing the health of individuals and communities."<sup>2</sup> According to the ICMR, telemedicine may give clinical assistance, be linked to patient sitting at home, and enhance overall health results.

The national health policy-2017 has pushed for an E-health solution. The new telemedicine practice guidelines-2020 will help the health system use it more effectively.

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Given the paucity of health personnel, particularly for illnesses such as cancer, telemedicine has been considered as a future health option. According to Smrke et al. (2020),<sup>3</sup> telemedicine may benefit the public and the health-care system by promoting, preventing, treating, and providing palliative care. Telemedicine can be utilized at the Provider to Provider (B2B) and Provider to Patient (B2C) levels, according to the guidelines.

## 2. Objectives

1. To review the telemedicine scope for cancer care in India and in the North Eastern region.
2. To find the people's perception on uses of digital media and telemedicine related cancer awareness and prevention in Arunachal Pradesh.

## 3. Literature Review

Agarwal et al. (2020) stated that telemedicine can aid in the battle against various diseases during a pandemic, such as chronic diseases, psychological treatment, reducing the strain on tertiary hospitals, and training care professionals.<sup>4</sup> Telemedicine is a tool that can be used to solve many medical problems, but certainly not all of them (Vinoth et al., 2019).<sup>5</sup>

Cancer incidences in India were 1.39 million in 2020 and are predicted to rise to 1.57 million by 2025.<sup>2</sup> In the early stages of the epidemic, the government of India issued telemedicine recommendations to all stakeholders, which has been seen as a key policy move for telemedicine in India (MoHFW, 2020). Grewal et al. (2020) identified telemedicine as a cancer-care potential for low- and middle-income nations (Grewal et al., 2021).<sup>6</sup> Telemedicine has been described as an essential part of medical care, particularly during the pandemic. (Atreya et al., 2020).<sup>7</sup>

### 3.1. National guidelines for telemedicine for Cancer care- framework highlights

The telemedicine can be used for multiple purposes which have been summarized in Table 1 below.<sup>8</sup>

The 2017 National Health Policy emphasized the importance of digital health and telemedicine in expanding health-care access at a low cost (NHP, 2017).<sup>9</sup> The Government of India's National Digital Health Mission, which was launched in 2020, is already enhancing India's telemedicine and electronic health record policies.

### 3.2. Evidences – of telemedicine for cancer care in India

Tata Memorial Hospital has taken the lead in the creation of a national cancer grid. In India, 246 (May 2021) cancer care facilities have been linked with NCG (NCG, 2021). Table 2 summarizes the cancer care hospitals affiliated with NCG by

**Table 1:** Application of telemedicine for cancer care

S. No.	Service type	Sub Category
1	Prevention & Screening	Screening (Review of reports. Health Education Health Awareness Genetic Counseling
2	Diagnosis	Ordering investigation Review of reports
3	Treatment	Virtual tumor board for treatment planning Pre-treatment counseling (after first physical visit) Surgery / Therapy.
4	Follow-up & Rehabilitation	Post treatment surveillance for long term effects of treatment & relapse of disease Physical & psychological rehabilitation of cancer patients
5	Referral	Primary or secondary care setup to tertiary care center for treatment. Tertiary care center to secondary or primary care setup for follow-up
6	Second opinion	Diagnosis – pathology & radiology review Treatment related consultations for expert opinion
7	Palliative Care	Long term care at home/nursing home

state. Many private large brand hospitals also provide direct telemedicine treatments to needy patients via various private aggregated tele-health platforms.

The grid has fewer hospitals in the north eastern area. The region, however, has a higher age adjusted incidence rate (AAR) of cancers.

### 3.3. Digital infrastructure situation of the state – Arunachal Pradesh

Arunachal Pradesh, which has the lowest population density and the lowest internet connectivity reach in north eastern region, presents both a problem and an opportunity for telemedicine in the state. The new medical college has just been linked to the national cancer grid, although the state only has one tertiary cancer care center. Health and Wellness Centers have a nationwide strategy to link with telemedicine services, which may increase the number of tele-health consultations provided by HWCs.

### 3.4. E- Sanjivini- evidences – national and in the state.

In April 2020, nationwide telemedicine services began as E- Sanjivini for tele-consultation to primary health care facilities HWC and patients. The expansion of telemedicine services has been seen exponential (Chellaiyan, Nirupama

**Table 2:** National cancer grid hospitals

Zone	State	Number of Cancer Care Centres	
South- 138	Maharashtra	69	
	Tamil Nadu	20	
	Kerala	17	
	Karnataka	16	
	Andhra Pradesh	6	
	Telangana	6	
	Goa	2	
	Andaman & Nicobar Islands	1	
	Union Territory of Puducherry	1	
	Uttar Pradesh	13	
	Gujarat	12	
	Delhi	13	
	Madhya Pradesh	9	
West & Noth-72	Haryana	8	
	Punjab	7	
	Rajasthan	6	
	Uttarakhand	2	
	Chandigarh	1	
	Himachal Pradesh	1	
	Bihar	5	
East -23	West Bengal	5	
	Odisha	4	
	Jharkhand	3	
	Union Territory of Jammu & Kashmir	3	
	Chattisgarh	3	
	Assam	3	
	Meghalaya	2	
	Nagaland	2	
	North East -12	<b>Arunachal Pradesh</b>	<b>1</b>
		Manipur	1
Mizoram		1	
Nepal		1	
Tripura		1	
International -1	Zambia	1	

& Taneja, 2019).<sup>5</sup> Table 3 showing eSanjivini's service utilization, demonstrates that growth in the state has been slower than in other parts of India.

**Table 3:** e-Sanjivini service utilization

Date	India	Arunachal Pradesh
12-Oct-20	500091	47
02-Dec-20	900001	71
17-Mar-21	30,00,443	111

#### 4. Methodology

We sent surveys through Google forms on social media networks in districts with high cancer prevalence and asked participants to share them to family friends, family members, and co-workers. The snowball persuasive sampling approach was utilized. Before beginning to fill out the surveys, informed consent was obtained. For the purposes of analysis, respondents aged 18 years and above were considered. With 33 initial responses, questions were initially evaluated for reliability. The Cronbach's Alpha test result was 0.86. The Institutional research committee has approved the study.

565 responses were considered from those who consented to participate and had heard about cancer. The research was conducted from September 16, 2020 to December 31, 2020. SPSS version 23 and Excel programs were used to examine the data. Opinions reflect the views of those who have internet connection and can fill out the Google form connected to the link.

#### 5. Results

##### 5.1. Demographic profile

Maximum respondents were targeted in areas with populations of the major six subtribes, namely Nyishi, Galo, Adi, Monpa, Apatani, and Tagin. However, respondents from other subtribes were also included in order to better comprehend the general population replies. Educated adolescents who are experienced using the internet and can fill out a Google form link responded more favorably.

Data from 565 (301 females and 264 males) respondents on questions about digital health knowledge, views, and behaviors were examined. The average age was 27. Education level up to higher secondary – 30.6 percent, undergraduates – 54.9 percent, and postgraduates – 14.5 percent.

##### 5.2. Digital sources of cancer knowledge

The most reliable source of information is still the conventional method of learning. Digital media has a population reach of 75.93%. Electronic and print media accounted for 67.26 percent of the total. Different sources has highlighted in Figure 1.

##### 5.3. Preference on place for screening

The greatest number of responders, 202 (35%), are willing to choose screening at home provided inexpensive options are offered. Figure 2 shows people's preferences for cancer screening location and facility.

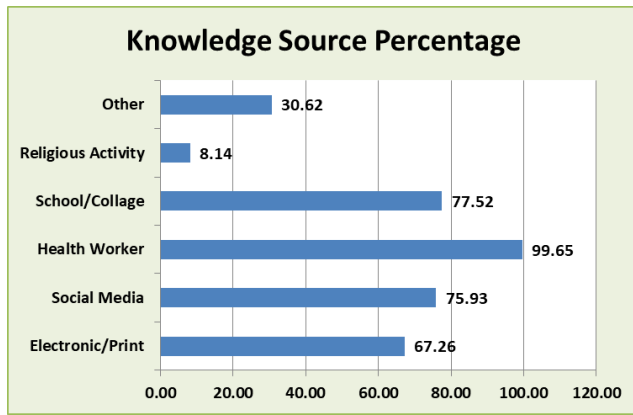


Fig. 1: Knowledge sources for cancer

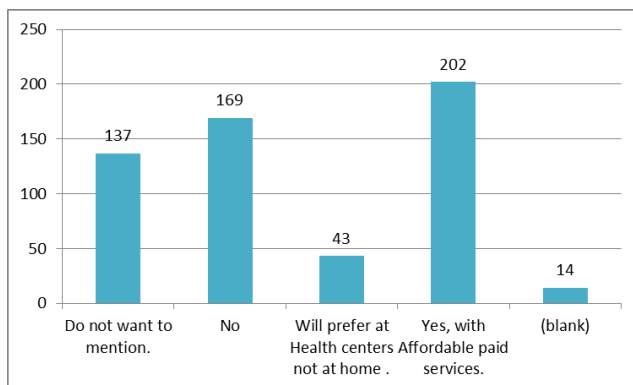


Fig. 2: People preferences for cancer screening place

5.4. View on self assessment knowledge

The majority of respondents (495) believe that self-assessment information will aid in early cancer screening and risk reduction. Figure 3 displays a summary of all responses on self-assessed knowledge.

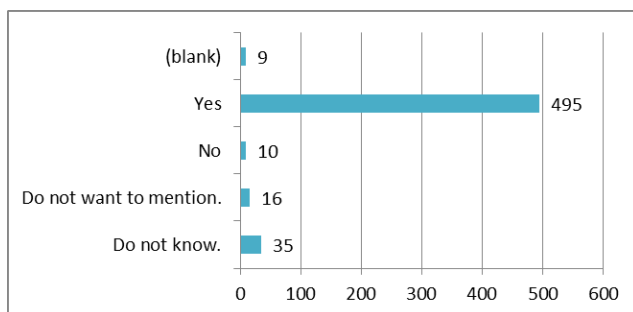


Fig. 3: View on self-assessment knowledge

5.5. Belief on tele-medicine advises

66.2% of the respondents believe that Tele-medicine advice (consultation through Internet/Mobile App/Telephone) will

enhance screening and treatment.

5.6. Online health searching for cancer risk reduction / symptoms / nutrition/ any other services for cancer patients

56.64% respondents have searched online related services for cancer risk reduction/symptoms/ nutrition/any other services.

6. Discussion

Respondents in their twenties have a strong belief in digital health-care delivery techniques. People with a higher degree of education prefer to use internet services. In the younger age groups, self-assessment procedures will be given. The majority of people feel that telemedicine can improve the health-care system for cancer patients. A well-educated youthful generation searches the internet for relevant services (Nathan et al., 2017).<sup>10</sup> Although internet access and speed are difficult to achieve, the younger educated populace has a more favorable attitude toward telemedicine services.

India is home to one out of every six people on the planet (Kaur & Aggarwal, 2019).<sup>11,12</sup> Because the accessibility of excellent healthcare varies greatly for diverse sectors of society, assessing the state of a particular health system in a particular region is critical to both domestic and global wellness (Mishra, Kapoor & Singh, 2019).<sup>13</sup>

The eHealth programs confront a number of problems, some of which have already been discussed [DiStefano et al., 2016; Mechael et al., 2019 & Battat et al., 2018].<sup>10,14-16</sup> Some, on the other hand, stand out for their likely recurrence. The scarcity of health care providers, particularly in rural regions, has a significant influence on eHealth services. Enterprises have challenges in training and retaining talented human resources (Qureshi, Farooq & Qureshi, 2021).<sup>17</sup> There is also a paucity of data on the sorts of incentives that are successful in encouraging such medical practitioners to adopt and use eHealth.

In India, eHealth is largely aimed at people who have been underserved by conventional medicine, and it is difficult to establish revenue driven initiatives since the majority of users are impoverished (Kustwar & Ray, 2020).<sup>18</sup> Charity organizations, especially ones that do not produce their own money, are typically unable to influence multitudes of consumers on a large scale. Funding is one of their most significant obstacles (Agarwal & Biswas, 2020). Because the costs are already so low, it may be impossible to try to boost the pool of beneficiaries by further lowering them (Sharma & Prashar, 2019).<sup>19</sup> There is also a risk that raising the prices would put the service out of reach for present beneficiaries. Consequently, Gokula (2020)<sup>20</sup> hypothesized that further measures may be required to place the programs on a more solid financial footing.

## 7. Limitation of the Study

This survey is restricted to those who utilize internet services. The viewpoint may not be representative of the wider community in the distant rural location where communication is difficult.

## 8. Conclusion

Despite the states' inadequate digital infrastructure, individuals have a strong conviction that digital apps would improve disease prevention in the states. People are aware that digital sources, together with other health services, will be useful in the future for cancer awareness and treatment. The rising trend of telemedicine use via eSanjivini demonstrates that individuals prefer to get services via telemedicine, particularly in pandemic situations. Because many patients are unable to access services, telemedicine applications of cancer need technical help for technological support and counseling to patients.

The telemedicine protocols will define a referral mechanism. North eastern specific structure, procedure, and standards must be developed for proper telemedicine usage. Private companies that can provide superior services should be included to the national Cancer grid to ensure consistency in advice, treatment, and other services. Patient electronic health records will be created in order to cross-utilize the grid. Patient or caregiver education for telemedicine aims to improve use and results.

## 9. Source of Funding

The authors report that they did not receive any money to perform this work.

## 10. Conflict of Interest

The authors declare that they do not have any conflicts of interest.

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## References

1. Census of India Website: Office of the Registrar General & Census Commissioner, India. [censusindia.gov.in](https://censusindia.gov.in). (2011). Available from: <https://censusindia.gov.in/2011-common/censusdata2011.html>.
2. ICMR- National Centre for Disease Informatics and Research. Report of National Cancer Registry Programme (2012-2016) [Internet]; 2020. Available from: [https://www.ncdirindia.org/All\\_Reports/Report\\_2020/default.asp](https://www.ncdirindia.org/All_Reports/Report_2020/default.asp).
3. Smrke A, Younger E, Wilson R, Husson O, Farag S, Merry E, et al. Telemedicine during the COVID-19 pandemic: impact on care for rare cancers. *JCO Glob Oncol*. 2020;6:1046–51.

4. Agarwal N, Biswas B. Doctor consultation through mobile applications in India: An overview, challenges and the way forward. *Health Inform Res*. 2020;26(2):153–8.
5. Chellaiyan VG, Nirupama AY, Taneja N. Telemedicine in India: Where do we stand? *J Family Med Prim Care*. 2019;8(6):1872–6.
6. Grewal US, Shankar A, Saini D, Seth T, Roy S, Aden D, et al. Telehealth and cancer care in the era of COVID-19: New opportunities in low and middle income countries (LMICs). *Cancer Treat Res Commun*. 2021;27:100313. doi:10.1016/j.ctarc.2021.100313.
7. Atreya S, Kumar G, Samal J, Bhattacharya M, Banerjee S, Mallick P, et al. Patients'/Caregivers' perspectives on telemedicine service for advanced cancer patients during the COVID-19 pandemic: An exploratory survey. *Indian J Palliat Care*. 2020;26(Suppl S1):40–4.
8. ICMR- National Centre for Disease Informatics and Research. Framework for Telemedicine use in Management of Cancer, Diabetes, Cardiovascular Disease and Stroke in India. Bengaluru: ICMR-National Centre for Disease Informatics and Research; 2021.
9. Ministry of Health and Family Welfare. The National Health Policy 2017- Executive Summary [Internet]. New Delhi; 2017. Available from: [https://www.nhp.gov.in/nhpfiles/national\\_health\\_policy\\_2017.pdf](https://www.nhp.gov.in/nhpfiles/national_health_policy_2017.pdf).
10. Pennell NA, Dicker AP, Tran C, Jim HSL, Schwartz DL, Stepanski EJ. mHealth: Mobile Technologies to Virtually Bring the Patient Into an Oncology Practice. vol. 37. and others, editor. American Society of Clinical Oncology Educational Book; 2017. p. 144–54.
11. Agarwal N, Jain P, Pathak R, Gupta R. Telemedicine in India: A tool for transforming health care in the era of COVID-19 pandemic. *J Educ Health Promot*. 0190;9:190.
12. Kaur S, Kaur R, Aggarwal R. E-health and its Impact on Indian Health Care: An Analysis. *Paradigm: Manag Res J*. 2019;23(2):164–74.
13. Mishra SK, Kapoor L, Singh IP. Telemedicine in India: current scenario and the future. *Telemed J E Health*. 2019;15(6):568–75.
14. Distefano MJ, Schmidt H. mHealth for tuberculosis treatment adherence: a framework to guide ethical planning, implementation, and evaluation. *Glob Health Sci Pract*. 2016;4(2):211–21.
15. Mechael P, Batavia H, Kaonga N, Searle S, Kwan A, Goldberger A. Barriers and gaps affecting mHealth in low and middle income countries; 2019. Available from: [http://www.globalproblems-globalsolutions-files.org/pdfs/mHealth\\_Barriers\\_White\\_Paper.pdf](http://www.globalproblems-globalsolutions-files.org/pdfs/mHealth_Barriers_White_Paper.pdf).
16. Battat R, Seidman G, Chadi N, Chanda MY, Nehme J, Hulme J, et al. Global health competencies and approaches in medical education: a literature review. *BMC Med Educ*. 2018;10(1):1–7.
17. Qureshi MM, Farooq A, Qureshi MM. Current eHealth Challenges and recent trends in eHealth applications; 2021. Available from: <https://arxiv.org/ftp/arxiv/papers/2103/2103.01756.pdf>.
18. Kustwar RK, Ray S. eHealth and Telemedicine in India: An Overview on the Health Care Need of the People. *J Multidiscip Res Healthc*. 2020;6(2):25–36.
19. Sharma RK, Prashar R. Feasibility of ehealth implementation in India learning from global experience. *Asia Pacific J Health Manag*. 2019;14(3):12–23.
20. Gokula RRM. Telemedicine in India and Its Impact on Public Health. In: Technology and Global Public Health. Cham: Springer; 2020. p. 303–16.

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