

# Healthcare Delivery Systems in Rural Areas

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## Abstract

Health care is a fundamental right of every human being. About half of the world's population (An estimated 3.4 billion of the world's 7.6 billion in 2018) lived in rural areas. Individuals in rural areas often have poor access to healthcare because of poor accessibility and availability of standard healthcare systems and socio-cultural factors affecting their perception of health compared to the urban population. Though there is a projected decrease in the absolute percentage of the world's population dwelling in rural areas by 2050, there is also a projected increase projected increase needing of prioritizing rural health. This chapter shall discuss the critical factors that disadvantage the rural population. It also considers the methods used to work out rural healthcare delivery strategies to decrease this disparity in rural areas' health care facilities.

**Keywords:** Rural Health services, Telemedicine, Health services accessibility, Telemedicine, Health Policy

## 1. Introduction

Healthcare is a fundamental right of every human being and everyone's responsibility [1]. When healthcare is viewed as a right and a responsibility, the state's active role in maintaining its people's health becomes even more pro-active more pro-active. This remedies the often-neglected individual's responsibility toward his/her health. There has always been an inverse distribution of healthcare services in rural when compared to the urban population, which is often referred to as the inverse care law or Pareto's Law. Pareto's law of distribution applied to healthcare (according to the British General practitioner Julian Hart in 1971) hypothesized that those in the greatest need of medical services in healthcare get the lowest quality possible healthcare and at the very end [2].

The term rural population also differs from country to country and is defined by the country's statistical office. In 2019, the world bank estimated that about 3,397,467,990 individuals were residing in rural areas globally. However, the global increase in rural population has been less than 1% per annum [3]. Even though these population growth rates in rural areas are minuscule there is also a projected increase in population. The existing deficiencies in the healthcare delivery system rural areas will only compound the problems with further urbanization and the healthcare policies favoring healthcare privatization [4]. There is also a growing need to create rural communities which are healthy and at par with healthcare facilities in urban areas [5]. Therefore, prioritizing rural health is imperative and will be a dire necessity for the future.

## 2. Definitions in rural healthcare

Rural healthcare delivery systems are often deficient in human resource, infrastructure structure, equipment, and financial support. These are essential to provide quality clinical and community healthcare services to the population they cater to. Some countries define healthcare services provision in areas (or communities) that are at a distance of more than 80 km or more than one hour by road from a designated healthcare facility (providing round the clock anesthesia, surgical and obstetrical facilities) [5]. This phenomenon, however, is relative to urban healthcare delivery systems and not an absolute absence of healthcare facilities. The services providers in rural areas are mainly the state or the government. The rest of the health care providers in rural regions are primarily indigenous systems of medicine with or without formal training in healthcare provision.

Remote healthcare is a term often used interchangeably with rural healthcare. Remote healthcare refers to hard to reach areas geographically. This happens mainly in the rural areas where access via roads are challenging [5, 6]. These areas may benefit from a remote health monitoring system, especially for health conditions and diseases that need long-term healthcare. These regions, however, would be significantly helped by the use of Telemedicine, given information and communication technology widely available. Whenever access to healthcare for an emergency or serious condition is required, these remote areas would need referral-service access to a secondary or a tertiary healthcare facility.

Rural Healthcare access is the ability of rural communities (or individuals residing in such communities) who can be promptly approached for health promotive, preventive, curative, and rehabilitative services. This works on the tenets of availability, utility, acceptability, feasibility, and equitability [7].

Barriers to healthcare access are systematic hindrances that may interfere with access to healthcare systems. In rural health systems, they could be broadly classified as structural (Infrastructure, human resources and time-related inadequacies), financial (leading to catastrophic expenditures, unaffordability of medical aid, or lack of completeness in treatment due to inability of money) or personal or socio-cultural (Physical and/or physiological hindrances, socio-cultural inappropriateness) [8].

Social Acceptability of rural health services may be defined as the individual's subjective-attitudinal perception of health care service provision and providers [9]. Acceptability may also refer to the pertinent interaction and client satisfaction accompanying service provision in the socio-cultural context of the rural areas [10].

## 3. History of rural healthcare delivery systems

**China:** An excellent example of a rural healthcare delivery system was the "Barefoot doctors" of China. In 1965 Urban doctors trained young farmers in Shanghai's Chiang Chen Province in primary medical care. These later formed the backbone of China's medical aid services [11, 12]. After a training period of three to six months and regular skill up-gradation with in-service and apprenticeship programs, these part-time healthcare providers. The healthcare provision in these areas enjoyed the local Chinese population's support [12]. They were trained in preventive, promotive, and rehabilitative healthcare provision in traditional Chinese and Modern (or Western) Medicine, alongside providing medical care. These part-time healthcare providers, also developed a robust system for referral for complex medical and surgical cases to a secondary or tertiary healthcare facility [4]. The financial support for such healthcare providers was both from a collective and mutual aid

basis. However, in 1978 major health reforms in China heralded a new breed of barefoot doctors to medically more qualified “Village health Doctors” and medically lesser qualified “rural health workers” (through an annual assessment) that led to the downfall of this system [13].

The financial moratorium also changed from a collective and mutual aid basis (through a rural cooperative medical system) to a paid service model. The new system in China rolled back many positive health reforms. These reforms included reduced mortality, improved life expectancy for almost three decades and most importantly widening the already existing urban and rural health disparity [14].

**India:** The concept of Community Health Worker (C.H.W.) was introduced under the “National Village Health Guide Scheme” much before the idea of primary healthcare (through the Alma Ata declaration at Kazakhstan in 1978) was proposed [15]. However, lack of affiliation to a formal health system, poorly defined job responsibilities, and poor financial remuneration plagued the Village Health Guide scheme’s success.

In India, maternal and child health, especially midwifery and childbirth assistance, was mainly through the “Traditional Dai” system. However, lack of formal training in midwifery and safe delivery practices led to significant mortality and morbidity among mothers and infants. Training of these traditional birth attendants in 2006 under the National Rural Health Mission (NRHM) was an essential step toward providing trained birth assistance and improving mothers and newborn health in rural areas.

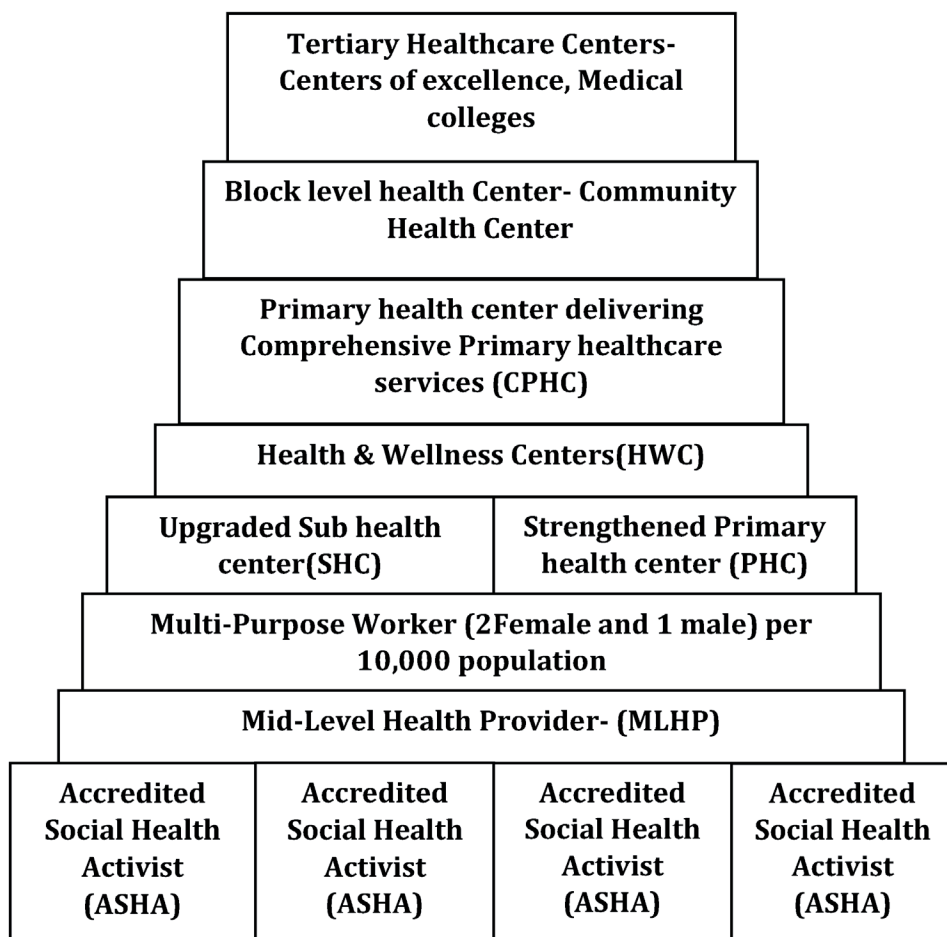
The paradigm shift in India’s healthcare provision was through the National Rural Health Mission effort in health activism through ASHA (Accredited Social Health Activist). Through local community participation, an ASHA worker proficient in various aspects of preventive, promotive, rehabilitative services largely concentrated in maternal and child health through local community participation. The ASHA worker also collaborates with local rural bodies to improve health, sanitation, and nutrition in India’s rural communities, a bottom-up approach [16].

The healthcare system in India had stressed the need for primary healthcare right from the pre-independence era (The Joseph Bhore Committee report in 1946) [17]. The Health Survey and Development Committee report (or the Bhore Committee Report) laid down the blueprint for a three-tier system to deliver healthcare at centers in India before the first national health policy, in the year 1983. The unique nature of the Indian healthcare sector is the blend of traditional (commonly called the AYUSH system- made up of Ayurveda, Yoga, Unani, Siddha and Homeopathy medicine) and allopathic medicine that is made available through a myriad of public and private healthcare providers. However, these healthcare services are also negatively skewed toward the rural areas where more than 60% of the population resides.

The three-tier healthcare system is divided into the primary or first point of contact of healthcare through the sub-centers that cater to a population of 3000 to 5000 [17]. The sub-centers are then linked to the Primary Health Centers (P.H.Cs.) established in the rural and urban areas for a population of 30,000 in plains and 20,000 in hilly and tribal areas. The first point of referral for the Primary health centers in the Community Health Centers (C.H.C.) is set up for every 1,20,000 population in plain areas. Every 80,000 people in hilly, tribal areas form the second tier of the public health system in India. The third tier of healthcare providing tertiary healthcare is the First Referral Units (F.R.U.)s that are set up at district or sub-district levels with round- the-clock services for healthcare. These public healthcare centers were plagued with human resource and infrastructural deficiencies. They suffered a vital mechanism for referral of patients and follow-up from higher level healthcare centers, with less than 11.5% seeking healthcare at these centers [18]. However, the private

healthcare sector and the non-governmental healthcare agencies also contribute to addressing the population's healthcare needs. Because of financial and other infra-structural strengths, these healthcare facilities are often beyond the reach of many, especially in rural areas [18]. Under the country's National Health Mission (N.H.M.), through the National Health Policy of 2017, recommended the establishment of "Health and Wellness Centers (H.W.C.)" for delivery of Comprehensive Primary Healthcare (CPHC) by up-gradation of sub-centers and Primary Health Centers as shown in **Figure 1**. The deficiencies seen in the implementation of rural healthcare seen earlier would now be overcome by improved spending to up to 70% of the budgetary allocation, institutional and governmental mechanisms under the flagship of National Health Mission (N.H.M.) for Primary Health care for Universal Health Coverage (UHC) in India and the Pradhan Mantri Jan Arogya Yojana (PMJAY).

**Australia:** The Australian Whitlam Labour government in 1972 pioneered setting up policies for the rural and remote regions of Australia, especially those residing in Australia's suburban areas. The Hawke Labour government of 1982 renewed its commitment to healthcare services' access and equity in Australia's remote and rural areas. The national conference at Toowoomba to design and set up a policy of initiatives for rural health in the late 1980's paved the way for the National Rural Health Strategy of 1994 that the Australian Health Ministers Council promulgated.



**Figure 1.** Re-organization of public healthcare facilities for Rural India under the Ayushman Bharath scheme in India [18].

The National Rural Health Strategy through the RHSET programme, the Rural Incentives Program and the collective efforts of the doctors, nurses, Allied health professionals' associations worked toward healthcare service delivery in the remote and rural areas of Australia along with a Non-governmental rural health body called the National Rural Health Alliance. Although these efforts were primarily focused on incentivizing doctors and other paramedical staff of rural and remote Australia, it was ineffective in satisfying the rural health concept. This was because of issues of financial, infrastructural resource allocation to this programme, as indicated by the performance indicators measuring the remote and rural Australians' health.

The Australian rural and remote health program underwent a radical change through a dedicated policy framework improvement keeping in mind the provision of health services in these areas by 2008 and Healthy Horizons. This programme currently supports the implementation of local programs that are culturally sensitive, practical forging partnerships in the community and the health care providers by equipping the physical and social capabilities of rural and remote health care service centers in Australia [5].

**United States of America** -through rural public health began to rise in the early 1700s, the focus was more on improving and maintaining water supplies and sanitary conditions. However, in the late 1800s, with the spread of diseases from urban to rural communities, the focus shifted to improving rural health facilities from 1908 to the end of World War II. The Hill-Burton Act of 1945 promoted healthcare delivery access in rural areas via rural community hospitals [19].

**Mexico:** The social service year reform of 1930 was sponsored by President Lazaro Cardenas, where medical students had to compulsorily put in 5 months of rural healthcare service as part of their graduation. This helped bridge the health-related gaps in rural areas. Though there was a significant improvement in rural health, a lack of cultural impressionability caused setbacks in the desired outcome as anticipated by the medical graduates. Influenced by the Alma Ata declaration of 1978, the Coplamar system, a Social Protection of Marginal Groups program, was launched, wherein community-based health practitioners were trained in maternal and child health by ensuring community participation in rural communities. However, within years of introduction, the scheme suffered significant losses in funding and the scheme lost its popularity. The Coplamar system was later re-christened as the Opportunities program, a conditional cash-based transfer system that continues to function in rural Mexico [20].

#### **4. Definition of rural health and its impact on health-seeking behavior**

The World Health Organization (WHO) defines health as “The state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity”. Perception of health was considered “working hard, staying busy, exercising, drinking water and eating well”. Being healthy often referred to a more subjective consciousness of self-dependence to carry out their daily living activities in rural areas. A relative inability to carry out Daily activities to maintain a household or to perform farm-related chores was considered ill health. This perception of subjective health and wellbeing is particularly true in rural elderly. Physical, mental, social, and spiritual wellbeing are knitted into a mosaic of the everyday life fabric of rural elderly [21]. There is a distrust, especially in seeking professional help for mental health-related issues. The presence of indigenous systems of healthcare usually handles the burden of preventive and promotive health services. However, they are generally not trained or qualified in managing emergency medical conditions and have an inadequate system for referral for these conditions.

The intuitive feeling of health compounded with a low level of trust in the medical healthcare system, decreased demand for services for the “non-urgent” health issues” by healthcare providers, long waiting periods at hospitals for health-related issues. These factors often translate to neglect and apathy toward health-seeking at in the health care institutes in rural areas [21]. This perception of health and disease in rural residents goes a long way in planning healthcare service provision in rural areas [21].

## **5. Situational analysis of rural healthcare delivery system**

Disparities exist among urban and rural healthcare delivery systems, but within the healthcare systems, there exist socio-cultural and ethnic differences in the accessibility and utilization of healthcare facilities [22]. The situational analysis will focus on aspects of any healthcare system, i.e., accessibility, utilization, acceptability, feasibility, and equity.

### **5.1 Differences in urban and rural healthcare service delivery systems**

#### *5.1.1 Accessibility*

Healthcare services in rural areas are less accessible than the urban areas, which could be attributed to the topographical differences [5, 23]. Studies from the Indian subcontinent show that the bed population ratio, percentage of trained medical practitioners, and healthcare provision infrastructure are substantially lesser in rural areas compared to urban areas [4]. Even with a sharp increase in the need for emergency services for rural residents when compared to the incremental rise among urban residents in need of emergency services [24], more trained emergency physicians were present in urban areas than rural areas [25]. The number of healthcare professionals and availability of medical services in remote areas is sparse [5]. The problems with transport facilities and communication technologies further compound the problem of poor healthcare accessibility [23].

#### *5.1.2 Utilization*

The factors that enabled healthcare service utilization in Africa’s urban areas were motivational benefits, the individuals’ current health status, and services availability. However, in rural areas, geographical adjacency, free or low-cost healthcare availability, health insurance, ethnicity, and family income, influence the rural residents’ health services utilization [26]. In general, the individuals would preferred to be treated by healthcare personnel of the local areas, though often under-staffed or resource-constrained [23]. The underutilization has also been attributed to the lack of quality-assured healthcare services sensitive to people’s health needs in rural areas [27].

#### *5.1.3 Acceptability*

The concept of acceptability has frequently been intermingled with availability and affordability of healthcare service provision and patient satisfaction [10]. The concept of trust in the healthcare provider, endorsement of the provider by leaders in the rural community in addition to early community interaction and home visits were found to improve the acceptability of maternal and child healthcare services in rural Uganda [28]. In rural northeast India, facilities for safe and sound quality healthcare services were linked to healthcare service acceptability [29].

#### 5.1.4 Feasibility

The availability of healthcare-related services was substantially lesser in institutes providing rural healthcare vis a vis with their urban counterparts [30].

#### 5.1.5 Equity

Equity in healthcare within rural areas also play an essential role in the rural healthcare delivery system. In the Republic of Suriname, a study conducted showed that equitable resource distribution for primary healthcare services was comparable in rural and urban areas. However, factors like perceived need, female gender, and socioeconomic status contributed to inequity for services related to chronic healthcare-related issues within the Republic of Suriname's rural areas [31].

Provision and upgrading healthcare-related insurance schemes and policies positively contributed to reducing the inequitable distribution of healthcare services [31]. The Development of tailor-made healthcare services addressing these principles to provide timely, socio-culturally appropriate, economically sustainable and equitable services in rural areas is necessary [5, 32].

## 6. Challenges in healthcare delivery in rural areas

The healthcare facilities in rural and remote areas are often deficient in core or essential health services, especially for support and local outpatient basis treatment [33]. The problem of shortages in trained global healthcare force and support, provision of geriatric and mental health services, infrastructure for timely healthcare services have affected rural healthcare services more than urban services [5]. The lack of healthcare insurance and the treatment costs incurred compounded with the insufficient healthcare expenditure of Gross National Product (G.N.P.) on health has worsened this situation [34]. The rural population of elderly, sick, uninsured and suffering from chronic diseases is significantly higher than its urban counterpart, which need to be addressed [33].

## 7. Ideal system of rural health service delivery

Planning rural healthcare services need an optimum mix of primary and secondary healthcare services at the community and individual levels. An ideal system delivering rural healthcare services should focus on “core healthcare services” or basic health-related amenities for maternal, child health, oral health. This must also include primary health care providers and emergency services for stabilizing patients needing urgent medical care with a timely referral system that provides a continuum of care [35]. The health systems should be locally sourced through community-based organizations, depending on the rural community's health care needs through a formal inquiry vide community- healthcare- needs assessment [35]. The aim of delivering healthcare in rural areas should not be limited only to improve the quantum of services provided but also the quality of healthcare services [35]. The Institutes of Medicine (I.O.M.) quality in healthcare can be approached through an integrated prioritized public health intervention at individual, family, community levels [29]. There should be provision for a support system for the healthcare service delivery personnel and the communities they serve through appropriate education, financial incentives, human resource, and infrastructural capacity. The feasibility and acceptability of Information and

Communication Technology (I.C.T.), especially for diagnostic emergencies like Acute abdomen, Myocardial infarction, Stroke etc., should be explored, especially in remote areas [34]. These systems of I.C.T., if feasible and planned correctly, can be used for monitoring of chronic that arise in Non-communicable and communicable diseases [34]. Leveraging the concept of a “healthy village” like the RURBAN initiative in India needs to be looked at while planning services in these areas [27].

A health care team providing these services, which are community-based with sustainable financial sourcing, can ensure healthcare facilities from seemingly simple medical issues to complex health conditions needing sophisticated tertiary care health system interventions, need to be planned too. The rural health care services need to be backed up by community participation with leaders and members of both health and non-health-based organizations in the rural community. The above system would also need to be socio-culturally sensitive and appropriate, catering to the rural community's health needs. This healthcare provision will depend on the healthcare funding through the nation's allocation of funds for health for rural and urban areas [28, 29].

## **8. Devising a rural healthcare delivery system**

As emphasized by the Alma Ata declaration of 1978 in Kazakhstan, any health-care system's precept should be based on primary healthcare [36]. Scarce resources are allocated in terms of human resources, infrastructure, and money for rural healthcare delivery, equitable healthcare provision can be made possible only by improving accessibility and acceptability of healthcare services among rural communities [18]. Sustainable healthcare delivery in rural areas can be possible only if the focus is shifted from providing healthcare service to providing a continuum of care in rural areas [6].

The Continuum healthcare delivery should be planned through a three-tier system of primary, secondary, and tertiary healthcare. This can be coordinated through collaboration and socially accountable healthcare institutes in these areas. In a consultation forum with Australia, Brazil, South Africa, Nepal, and India on A consultation forum with Australia, Brazil, South Africa, Nepal, and India on delivery of rural-primary healthcare, showed that geographically accessible, socio-culturally acceptable, family-centered healthcare needs to be developed. Integrating these concepts based on preventive, promotive, and curative, sensitive to the perceived requirements of the rural communities, need to be crafted. Creating a rural healthcare delivery system should begin with community healthcare needs and demands assessment that identifies potential strengths, weaknesses, threats, and opportunities in terms of human resource, infrastructure, and costs in building a sustainable rural healthcare delivery system sensitive to local healthcare needs. Once the healthcare-related needs are identified, prioritizing these needs based on either a nominal group technique or the Hanlon's basic priority rating system, or an intervention mapping can be employed. Implementing a healthcare system engaging community partners, a community-based organization ensuring the fullest community participation in making healthcare decisions through sustainable healthcare and financial incentivization schemes would be the next challenge to overcome.

When appropriate linkages being forged with referral systems, higher budgetary spending on healthcare by the states, healthcare insurance that improves affordability to build and empower healthcare teams providing rural healthcare [32]. With a shortage of trained rural healthcare professionals on health emergency and maternal and child health, individuals sourced from the local rural communities like the ASHA workers in India [16], Barefoot doctors in China [6, 12] could be looked at as potential bridges to the healthcare-related gap in rural areas. However, adequate and



regular training and accreditation of rural healthcare providers who are sensitive to the family-centered practice of evidence-based medicine are paramount [32].

A concept of extended-community-care team sourced from trained staff of urban social and healthcare professionals who provide their skill and expertise prevalent in Scotland's remote and rural areas [6]. Research models for developing such extended healthcare teams in rural and remote with evidence through health impact assessment can ultimately translate to advocacy for policy-orientation prioritizing rural health.

Dissemination of information in rural healthcare delivery systems in research is also paramount for other rural communities to develop or adapt such models to achieve the best healthcare-related outcomes.

## **9. Role of telemedicine in rural healthcare delivery**

Telemedicine has leveraged the benefits of advanced telecommunication and computer technologies, which can provide diagnostic and therapeutic support to patients residing in remote and rural areas [6, 37, 38]. Modern technology like Clinical Decision Systems (C.D.S.), Picture Archiving and Communication Systems (P.A.C.S) that capture, store, and disseminate health-related information from patients in rural and remote areas to healthcare providers on a real-time basis. These systems can help in making immediate and urgent healthcare decisions in these areas [37]. Information and Communication technologies improve accessibility to primary health care needs, maximizes service delivery, transfer and sharing of appropriate technology for instruction, training, continued education of healthcare service providers is also maximized in rural and remote areas [39, 40].

The characteristics of a programme that supports information and communication technology in remote and rural healthcare systems (which helps in return to improve health especially in developing countries are as follows:

1. Use of appropriate technology that is locally applicable to rural and remote health infrastructure
2. Leveraging and strengthening existing systems in the rural and remote communities
3. Demonstrating the benefit of using such health related information and communication technologies through showcasing of approaches in I.C.T delivery
4. Capacity building to innovate, develop and demonstrate the effectiveness of Information and Communication Technologies
5. Monitoring and evaluation through Participatory and Rapid Rural Appraisal
6. Designing better methods of communication strategies for delivery of health-care in rural and remote areas
7. Continued research and information sharing regarding the strengths and challenges faced in setting up such technologies in rural and remote areas [40].

The three-pronged benefits that can be reaped by use of Information and Communication Technology (I.C.T.) would be in

1. **Improvement in functioning of health care systems-** of order/billing and electronic health record systems development
2. **Improvement of delivery of healthcare** through use of telemedicine and e-health that help in diagnostic, clinical decision making, quality assurance systems, disease surveillance
3. **Improving communication about health** in health-related research, health advocacy, patient information retrieval and dissemination [40].

The information and communication technology can also aid in lifelong learning, improvement and retraining in healthcare delivery system's accountability [38]. The establishment of electronic health records using barcoding and other such indexing systems for an individual also helps in maintaining the patients' continuity of care [37]. The WHO e-health strategy envisages, e- health-solutions exploration by identifying and addressing needs, innovative methods and research. This provides evidence, information, guidance, best practices and management of such solutions in rural and remote areas [40].

The challenges in implementation of Information and Communication technology like telemedicine, e-health include:

1. The lack of access to internet and mobile connectivity
2. The lack of credible and culturally sensitive information and communication technologies,
3. Insufficient political commitment toward establishment of a sustainable system for health information and communication
4. The need of extensive co-operation from stakeholders at the local, regional and national levels,
5. Paucity of foreign development investment for establishment of information and communication technologies.

## **10. Conclusions**

Rural and remote healthcare delivery is essential to achieve a "Healthy Nation" through quality-assured core or basic healthcare centered on preventive, promotive, curative and rehabilitative service delivery. The healthcare- delivery system's focus on a constraint resource setting, lies in developing tailor-made models for the sustainable provision of healthcare facilities in rural and remote areas. Healthcare research into factors affecting accessibility, utilization, the feasibility of healthcare delivery models in rural areas should be encouraged to provide advanced insights into what works and what does not work in rural areas. The opportunities offered by information and communication technology, (including Telemedicine) bridge the gaps in rural and remote areas.

## **Conflict of interest**

The authors declare no conflict of interest.

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