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EMPOWERING HEALTH SECTOR THROUGH DIGITAL INDIA INITIATIVES**CHINNASAMY. V****SCIENTIST D****MINISTRY OF ELECTRONICS & INFORMATION TECHNOLOGY (GOVERNMENT OF INDIA)****NEW DELHI****ABSTRACT**

Digital India is strengthening the Information and Communication technology (ICT) Infrastructures across India. This is more helpful in extending urban health care services into rural, unreachable and remote parts of India. Health MMP has become more digitally innovative by implementing e-Kranti principles. Mother and Child Tracking System (MCTS), Kilkari & Mobile Academy schemes have exploited USSD and IVRS services to check and combat Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR) etc across nook and corner of India. The common Services Centre (CSCs) platform has been utilised to extend the telemedicine services along with other services. Web based e-Hospital Application has created innovations in Public Hospital Management eco system.

KEYWORDS

digital India, e-healthcare, common service centers, telemedicine, e-hospital.

INTRODUCTION

India has around 70% of the population resides in rural area. Rural India's economy is still largely agricultural based economy. Hence, prosperous and healthy lives of rural citizens are assets of India economy. Availability of various urban health facilities needs to be extended to the rural citizens with the help of ICT facilities. Every Government hospital serves approximately 61011 people across India. India has a doctor to patient ratio of 1:1700. In this juncture Digital India has taken various measures on utilising the ICT benefits to extend the urban Health services into rural India. Digital India empowers technology and the technology has power to improve access to healthcare services especially for people residing in rural, remote and far-flung areas

Recent developments in the ICT sector are revolutionising health care system by transforming health care administration, in public health care service delivery and management system. In Modern society, Internet is transforming the healthcare industry. Telecommunication networks and internet are best utilised to extend the health care services to the remotest corner of India. Government of India focuses on maximising the use of digital technologies for public wellbeing through Digital India Initiatives. National e-Governance Programme 2.0 (e-Kranti) has brought out various principles such as Mandatory Government Process Reengineering (GPR), Infrastructure on demand, Integrated services, Infusing Transformation, Cloud by default and Mobile first across all Mission Mode Projects(MMPs). Health MMP is one of the projects which are being rejuvenated by NeGP 2.0 Principles.

"e-Health is professional Application of Information and communication technological developments for the welfare of the healthcare of all living organism".

It initiates the healthy interaction between patient and doctor irrespective of distance. The increasing number of tools of ICT provides opportunity for extending efficient healthcare services to Rural India. Under Digital India, various healthcare initiatives have been taken to strengthen the public health care eco system in India. Government of India aims to access Universal health coverage (UHC) by 2022.

1) NETWORK FOR RURAL e-HEALTH SERVICES

Internet is becoming significant sources of public health initiatives and it provides increasingly accessible communication channels for growing segment of health conscious population. It provides an increasingly accessible communication channels for a growing segment of the population. Internet offers greater interactivity and better tailoring of information to all sectors including health sector. It also provides enough space for preventive care by providing better online clinical information. Robust Network connectivity can take Internet to nook and corner of our country.

Network connectivity is the major component in providing rural e-health services. Connectivity will extend health related activities in rural areas. The rural tele-density is just above 50%. The mobile Network across the country has to be used effectively for delivering services including health related services. Setting up of Network connectivity and its maintenance is a challenging one in the thinly and sparsely populated rural areas. In India, almost 75% of the qualified medical professionals are working in urban areas. A robust Network connectivity to rural, inaccessible and difficult terrain would help to extend the services of health professionals to those areas. The connectivity helps the health care eco system to reach out to individuals and it is the back bone of the electronic service delivery mechanisms for any scheme. Digital India has provided various initiatives for strengthening rural networks. The programme altogether focuses on improving network penetration across India and envisages filling up the gaps in connectivity across the country.

- 2,50,000 village panchayats would be covered under NOFN (National optical Fiber Network). This would be providing High speed connectivity across rural areas. Out of 2,50,000 gram panchayats so far, more than 48,199 connectivity have been established. Health eco system across rural India is envisaged to leverage NoFN high speed bandwidth Connectivity from Block to panchayat level for extending healthcare services.
- Around more than 2.2 lakh Common Service Centers (CSC) have been established to provide e-services in rural regions to bridge digital divide. The CSC platform is also being used for extending telemedicine services across India.
- A comprehensive plan has been launched for providing Mobile coverage to all uncovered villages. Hitherto unconnected 55,619 villages in the country will be extended with mobile coverage in a phased manner including connectivity for North eastern areas.
- DoT has initiated process to install around 4000 telecom towers and related infrastructure in North-eastern states with the help of viability gap funding and BSNL has also been advised to embark on network rollout schemes for Arunachal Pradesh and two districts of Assam.
- CSCs would be strengthened by providing connectivity through NOFN service points and its number would be increased from 2.2 lakhs to 2.5 lakhs through CSC 2.0 programme.
- Recent National Health policy supports for using National Knowledge Network(NKN) for tele-education, tele-consultations and access to digital library etc.
- It is envisaged to setup National Medical College Network (NMCN). Initially 41 Govt. Medical Colleges will be riding over National Knowledge Network (NKN). It is to be completed in another five years.
- There is a proposal to Create National Telemedicine Network (NTN) to connect Government Medical Colleges, District hospitals, Sub Divisional Hospitals, Community Health Centre (CHC) & Primary Health Centre(PHC) across India in a phased manner with incremental approach.

A Mission of project called Digitally Inclusive Smart Community has been initiated which envisages to reduce distance barrier of rural areas through nationwide implementation of telemedicine technology by establishing Tele-Consultation Centres (TCC) and linking community level institutions with specialised healthcare institutions. This initiative intends to create more numbers of Tele-Consultation Centres (TCCs) across the country including rural and semi urban areas and plans to augment sufficient number of Tele-medicine Centres in a phased manner at Specialist Hospitals (SH) in state /UTs for delivery of specialised health care services. Ministry of Health and family welfare shall leverage all these initiatives for various services like Telemedicine, m-Health, National Medical College Network (NMCN), National Rural Telemedicine Network, and for various other e-Governance activities to improve National health care eco system etc.

In the National Medical College Network (NMCN) Scheme, which is being implemented by Ministry of Health and Family welfare (MoHFW) 41 Government Medical Colleges including six medical colleges from North eastern region would be networked using National Knowledge Network (NKN) in the first phase. In this scheme, each medical college would be provided with latest ICT equipment for video Conference, Tele-Consultation facility, Tele-Mentoring, Live Lecture streaming etc. It will be useful for e-education and National Rural Telemedicine Network for e-Healthcare service delivery.

2) HEALTH MMP

Health MMP under Digital India is envisaged to establish a pan-India integrated health information system along with online medical records & Health information exchange. The MMP has been restructured & revised. The key components of the MMP are mother & Child tracking system (MCTS), Health Management Information System (HMIS), Training Management Information System, Drug Supply Chain Management, National Health Portal (NHP), Promotion of Electronic Health record (HER) etc.

Integrated Health Information platform is envisaged to be established in selected states to facilitate, interoperability, creation & exchange of medical records, citizen services and programme management etc. There is also a proposal to facilitate interoperability and information exchange between different IT systems including private sector systems. It would be in compliance of Meta data and data standards of Govt. of India. NHP (National Health portal) has launched a voice portal for providing various information like health related issues, diseases, lifestyle, first aid, directory services, health programme etc. through a toll free number. Presently, the information is available in 5 languages namely English, Hindi, Tamil, Bangla and Gujarati. In future more languages will be covered. The Voice portal has been architected to meet the needs of the common people. Though information accessed through voice portal is limited, it can be accessed even through Low end mobile handsets. It also facilitates for wider reachability of Information.

a) MCTS

Mother and Child Tracking System (MCTS) is one of the successful Mission Mode Projects (MMP) under National e-Governance Plan (NeGP). It consists of web and mobile based monitoring applications. Total registration in MCTS includes over 10 crore mother, over 9 crores children & over 11 lakh Health workers (ANM & ASHA) for tracking and monitoring health services being offered to pregnant women and children under various scheme. It boosts institutionalized deliveries and provides access to health related services to pregnant women before and after delivery. It is a national System. It has been integrated with SMS, USSD and IVRS as delivery channels for providing real time services to the MCTS beneficiaries and workers.

- It tracks and delivers services of health care and immunization services to pregnant woman and children upto 5 years of age. It establishes two-way communication between the service provider and beneficiaries.
- It provides mother and Children fact sheets, reporting and seeding of Aadhaar number for direct cash transfer to relevant beneficiaries and its monitoring.
- Generation of work plans of ANMs (Auxiliary Nurse Midwife), sending regular alerts to the service providers as well as beneficiaries about the services due and user friendly dashboard for health managers at various levels to monitor delivery of services. The health worker receives regular SMS from MCTS portal to follow up the child and provide immunization services.
- It ensures that immunization is given to children as per schedule by sending SMS to beneficiary mobile phones.
- The Health worker ANM (Auxiliary Nurse Midwife)/ ASHA (Accredited Social Health Activist) provides services to the parent/child and the updated real time data are fed into MCTS portal by USSD messages through Mobile phone from the remotest part of the country. It also helps for validation of Mobile Numbers of ANM/ ASHA. The users need not pay any cost for using the services in MCTS. The USSD messages create a real time connection during the session.
- Dedicated IVRS (Interactive Voice Response System) services platform is envisaged to educate beneficiaries about the pregnancy and childcare.
- Recently an audio based weekly mobile service has been launched on MCTS platform for the beneficiaries. The voice messages delivered will be relevant to the stage of pregnancy or the age of the infant.
- It is a management tool to reduce MMR (Maternal Mortality Rate) /IMR (Infant Mortality Rate) /TFR (Total Fertility State) and track the individual healthcare service delivery.
- By implementing High-speed network connection across rural India, the real time data collection into MCTS system can be improved further.
- There is also a proposal to include the MCTS scheme in ESIC to track every pregnant mother and new born of an insured person. In this regard, a pilot project is to be launched soon in New Delhi.

b) KILKARI & MOBILE ACADEMY

Kilkari is an initiative of the central government for providing cost effective solutions to create proper awareness among pregnant women, parents of children and field workers about the importance of Anti Natal care, institution delivery, post-natal care and immunisation. The first phase of kilkari was launched on 15th January 2016 under Digital India in 6 states viz. Uttarakhand, Uttar Pradesh, Odisha, Rajasthan and Madhya Pradesh in high priority districts. Kilkari is an IVR that delivers free weekly time-appropriate 72 audio messages each of two-minute duration about pregnancy, child birth and child care delivery to family's mobile phones from the trimester of pregnancy until the child reaches a year old.

The project is basically to check and combat Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR) across state/UTs. The database for the kilkari programme will be taken from the successful Mother and Child Tracking System (MCTS) to monitor pregnant women and babies. It is known that the programme was first piloted in Bihar. Based on its success on Bihar, it was decided to launch it nationwide.

The first phase of the mobile Academy was launched on 15th January 2016 under Digital India in 4 states Viz Uttarakhand, Jharkhand, Rajasthan and Madhya Pradesh. Mobile Academy is a free audio training course designed to expand and refresh the knowledge base of Accredited Social Health Activities (ASHA) and improve their communication skills.

c) DIGITAL TECHNOLOGY BASED HEALTH ECO SYSTEM

Recent National Health Policy recognises the role of e-Health, m-Health, cloud, IoT and wearables etc) in delivery of healthcare services. It strives for implementation of Digital based public health care system. It envisages to set up National Digital Health Authority to regulate and deploy digital healthcare facilities across the Public health care eco system and to function as nodal National body for strategic initiatives in Public Health Sector. It envisages to promote integrated Health Information System and would strive for adoption of standards for promoting exchange of patient's health records across facilities in a secure way. IoT (Internet of Things) helps health sector for better Management of medical resources through supply chain management and introduces easy way for accessing real time information.

3) TELEMEDICINE

Healthcare is the basic need of any citizens. But lack of other infrastructure facilities and dearth of medical professional deprives rural population from accessing basic health care needs. Close to 30% of the rural population has to travel about 30 KM to get needy medical treatment. Due to this, rural population is reluctant to seek medical attention. By augmenting various infrastructure facilities across rural India health and telemedicine services can be provided.

a) CSC AND TELEMEDICINE SERVICES

The CSCs (Common Service Centers) are the ICT enabled front end service delivery outlet at the village level for enabling delivery of G2C, B2C services such as government, financial, social and private sector services in the areas of agriculture, health, education, entertainment, FMCG Products, banking, Insurance, pension, Utility payment etc. Health care is a basic need of every citizen. But lack of quality infrastructure and dearth of medical facilities thwarts its reach to the rural population. The key challenges here are lack of awareness, limited access to facilities and lack of affordable health solution for the low income rural population. The presence of nearly 2.2 lakh Common Service centres (CSC) across rural India provides various opportunities for rural population to access all these services including healthcare services. e-Health and telemedicine services are the solutions to provide access to quality health care to the rural masses of India.

Common Service Centres (CSC) at Panchayat level and in rural areas are manned by Village Level Entrepreneurs (VLE). It provides telemedicine services to rural areas in collaboration with Super speciality hospitals like Apollo Hospitals. It is based on Public Private Partnership model (PPP). CSC SPV had signed a MoU with Apollo Tele- Health Services to promote health care services in rural India through CSCs. Currently more than 10,000 CSC centres are active on the tele-consultation platform across all states in our country. The primary objective of this collaborative partnership is to provide grass root level access points for health services among the communities, developing health seeking behaviour and promoting preventive health care services among the rural population.

b) TELE-CONSULTATION SERVICES ON CSC PLATFORM

The custom designed web based telemedicine application is used for providing tele-consultation and medical advice services to patients at distant and remote locations. The Apollo telemedicine Electronic Medical Record (EMR) system helps rural CSCs to get appointment, store the medical record securely in the digital storage system. The data is accessed by doctors at the tele medicine Medical Response Center (MRC). Doctors examine and review the patients in real time remotely over the integrated video conferencing system. For every patient a case history is built at the MRC and online medical advice is extended. The medical advice and related information are shared with the respective CSC operator to ensure that the rural patient has understood his/her health conditions and the course of treatment, medication or routine tests and reports which the patient has been advised. Digital prescription is also shared with patients. The schemes are being utilised well on West Bengal, Uttar Pradesh, Tamil Nadu etc.

Through CSCs Tele-consultation platform, patients in locations that do not even have access to primary health care facilities can now connect to a doctor. Remote Tele monitoring devices are also used to monitor basic vitals and maintain patient health information electronically under single platform. CSCSPV has also initiated for providing Jiva Ayurvedic telemedicine consultation services. Through this scheme Ayurvedic based medicines and other products would be made available through CSCs.

Telemedicine requires videoconferencing, which demands higher data bandwidth. In rural areas, availability of higher bandwidth is the real bottleneck. This teething problem would be solved by speedy augmentation of NOFN infrastructures across rural India which is part of Digital India. There is also an initiative for developing low cost video conferencing facility.

Overall, the scheme envisages to create a healthy rural India. It reduces their travel to the nearest district head quarter hospitals. Moreover, it improves the lives of the citizen socially and economically. Through telemedicine service, CSCs provides Diagnostic and other support services. It also provides opportunity for rural entrepreneurship for the VLEs to increase their revenue and sustain their CSCs.

4) JAN AUSHASHI SCHEME THROUGH CSCs

Almost 80% of health care expenses are due to cost of medicines. Thus, access to low price generic drugs is very crucial for ensuring healthcare at affordable prices. The Jan Aushadhi Scheme launched by Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India aims to make available quality generic medicines at affordable prices to all citizens through special outlet known as Jan Aushadhi stores to be opened in each district of all states.

CSC has also been included as services center for extending the Jan Aushadhi Scheme across rural population. Under this scheme, CSCs will be hiring a pharmacist for opening Jan Aushadhi Stores. The omnipresent status of Common Service Centres and its vast infrastructure support across India helps the scheme for dispensing of Generic Medicines to the needy population. It helps to extend the scheme to the length and breadth of our country. Around 16 numbers of CSCs have opened the Jan Aushadhi stores. Moreover, nearing 3000 Applicants (VLEs) have requested for using the services under the scheme.

5) e-HOSPITAL SOLUTIONS

e-Hospital Suite is a web based solution, using Free Open Source Software (FOSS) tools. It helps patients across India to take appointments across 44 premier institutions. It facilitates Aadhaar based online registration. It provides appointments with various departments of different Hospitals. It conforms to HL7 standards for managing healthcare service delivery in public hospitals in India. The application has been hosted on the GI (Government of India) Cloud of NIC for all the public hospitals in India as Software as a Services(SaaS). It uses Digi-locker to store patient related records and sensitive information. It also brings more transparency in public healthcare system.

The Members of AIIMS and NIC teams have successfully launched the e-hospital Modules. AIIMS is poised to become the first fully digitalized public hospital. The digitalisation of hospital in terms of OPD registration, billing, electronics records, laboratory services and clinical diagnosis will result in enhancing patient satisfaction. AIIMS would hereafter be recognised not only for its unparalleled collective expertise in Medical sciences but also for its full-fledged augmentation of electronics platform. The innovations in terms of Nursing Information specialists, patient registration counters, self-service Kiosks and electronics record management are highly commendable.

It is also envisaged to set up ICT based Patient feedback system in public hospitals which will reduced the gap between the health practitioners and services seekers. The objective is to improve quality of care by obtaining patient feedback through technological based solutions and develop action plans at different levels of health system through different channels such as web portal, Mobile application, Short Message Service (SMS), Interactive Voice Response System (IVRS), etc. The applications will be integrated with e-hospital software.

6) OTHER USEFUL INITIATIVES

- NOFN pilot project has been launched in 59 Gram panchayats at three different states. Telemedicine services have been launched on NOFN platform to study its successful implementation by establishing DKC (Digital Knowledge Center). It is envisaged that the study will be useful for launching telemedicine services at National level.
- M-Cessation aims at reaching out to those willing to quit tobacco use and support them towards successful quitting through text messages sent via mobile phones.
- e-Sanjeevani is a web based comprehensive tele-medicine solution developed by CDAC, Mohali. It extends the reach of the specialised health care services to masses in both rural areas and isolated communities.
- All MMPs including health MMP have the support of cloud computing to host various services like M-Health, Health Information System (HIS) and, M-Apps via App store etc.
- Digital Lockers can be used to store health related documents, Medical reports in the form of electronic records. It will provide access to government issued documents. Aadhaar shall be used to authenticate the documents. The facility of e-Sign provided as a part of the system helps hospitals to share e-documents and minimise the use of physical ones.
- Ministry of Health and Family welfare (MoHFW) under M-health initiatives has hosted various Mobile-Apps. The Total number of mobile Applications in National Health portal adds to 70 including the Popular Mobile Application of National Health Portal (NHP). Apart from this, Mobile sewa App Store and Government App store hosts various health related Mobile Applications including e-Hospital App and MCTS App etc. Improved access to health related Apps empowers the patients and health seekers for easy access of health related information.
- Geospatial Portal Bhuvan can be used for health related applications such as Disease Surveillance System, tracking and monitoring of Disease outbreaks etc. In addition to this, various health related applications can also be developed using geospatial data.

7) CONCLUSION

Digital India is making ICT (Information and Communication technologies) more pervasive. M-Health initiatives have used SMS, USSD & IVRS Services effectively to reach health related information for vast number of needy population including rural and hitherto unconnected/remote population. The telemedicine & Tele consultation services are useful services for the citizens of India living inaccessible /difficult terrains to have specialist consultations through e-visits, e-consultations and m-prescriptions etc. Various Network expansion initiatives of Digital India empowers, the Health Ministry to augment various health related services on integrated Digital platform to reach across India including rural India. More and more R&D activities are being carried out on effective utilisation of telemedicine services. e-Hospital is striving to bring all the public hospitals into Digital Platform by taking cloud support into it. By following the principles of e-kranti (NeGP 2.0) Health MMP leverages more technology and transforms the public healthcare echo system. Thus, Digital India is empowering health sector to create more health conscious society.

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