

## **Scope of E-Healthcare Services in Uttar Pradesh: A Case Study of Lucknow Urban Areas**

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### **Abstract**

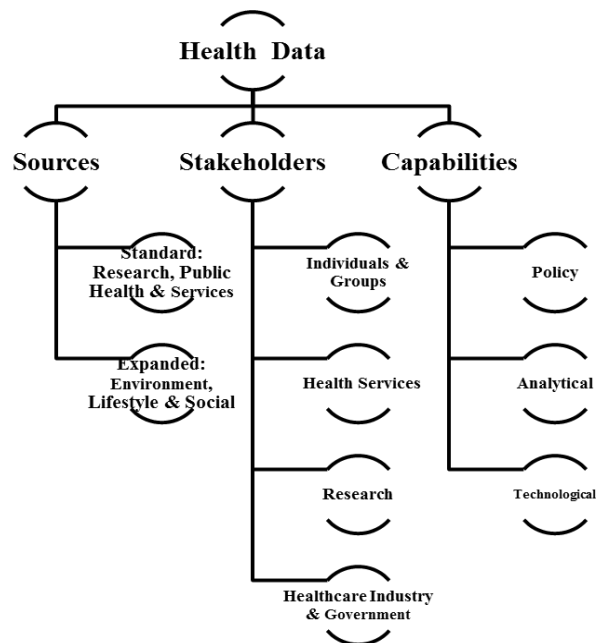
Innovation in the field of Healthcare will create new landmarks in this field. The Health related information in any country is confidential and is available in large amount. Effective Management of Health Data is important. E-Health exists in various forms. Mostly, the People living in Urban Areas having each sort of facility like Mobile Phone and good Internet Connectivity but then also they do not know about the free services provided by the Hospitals. There is less awareness about E-Health services in India. In this paper we had discussed about the E-Health Initiatives in Uttar Pradesh, the E-Health Models, its Architecture and its scope in urban areas of Lucknow, in detail and how it is essential for the automisation of Health Management System (H.M.S.). There are different forms of E-Health discussed in this paper like Automated Physician Order Entry, E- Prescribing, Decision Support System, M-Health and Health Informatics.

**Keywords:** E-Health, H.M.S., E- Prescribing, M-Health, Health Data

### **1. INTRODUCTION**

E-Health refers to Electronic Health. It is the future of healthcare services in India. It uses IT Technology that results in innovation. Its major beneficiaries are the citizens of India. 25308 Health Care centers are there in India. The primary focus of the Health care centers is Infant immunization programs, Anti epidemic programs, Birth control, Pregnancy and Health Care. By Adopting E-Health technologies we can

reduce the overwhelming burden on hospitals [1]. It refers to digital services used in Healthcare. In the Figure 1 and the E-Health Data Revolution is being illustrated the use of E-Health in different sectors of Industry with their Sources, Stakeholders and Capabilities. The Sources of Health Data are of two types i.e. Standard and Expanded. In the Standard Sources the fields like Research, Public and Healthcare Services are there and in the Expanded Sources the fields like Environment, Lifestyle and Social fields are involved. The group of Stakeholders involves Individuals as well as groups, Health Services provided by the government, Research in the field of Medicine and Innovation in the field of Healthcare Industry. In this Government also plays the major role. The Capabilities are of three types i.e. Policy, Technological and Analytical. Policy involves Principles, Aims, Tools, Governance and Ethics related to Healthcare Industry. Technological aspect of Health Data involves Generation, Storage, Curation, Extraction, Interoperability and Protection. Analytical aspect involves Visualization, Integration, Prediction, Modeling, Synthesis and Insight of the Health Data.

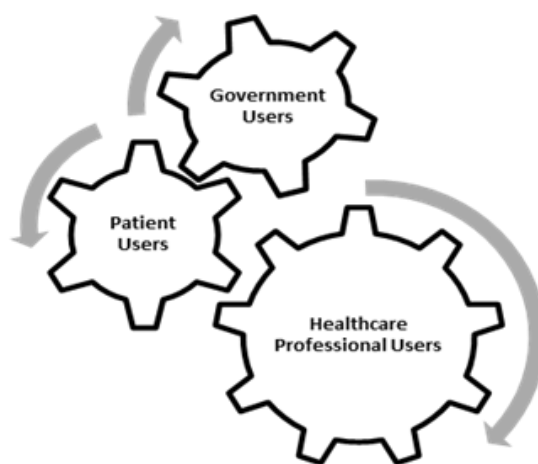


**Fig.1.** E-Health Data Revolution

The Organizations (W.H.O. & U.N.) across the world have inscribed E-Health as a replacement to address serious health problems in the developing nations [18-19]. The restrained accessibility of Laptops, Personal Computer (P.C.) and Internet is an area of major concern in developing countries. The citizens of developed country are more technology savvy as compared to the developing nations [9]. The barriers like Digital Divide (D.D.) have restricted the advantages that they could get from Latest Technology [20].

Different forms of E-Health exists namely Electronic Health-Related Records

(E.H.R.) [4], Electronic Doctor Prescription (E-Prescription) [8]. Electronic Health Records maintains all the records of the hospital electronically. Computerized Physician Order Entry involves the entire inventory within the Organization. Electronic Prescribing helps the patients as well as doctor for seeing the Prescription online. Clinical Decision Support System involves taking clinical decisions online providing help to patients as well as doctors [7]. The latest technology in the field of Telemedicine is the use of Wi-Max for building Medical Applications [33], the use of Mobile and Cloud Computing to reduce the costs associated to the Healthcare Industry [34], the use of Authorization System to share the Health data with different Hospitals [35] and the use of Wireless Sensor Network (W.S.N.) in the Telemedicine Industry plays a vital role in bringing innovation to this field [37- 40]. Many Challenges were faced in implementing E-Healthcare centers online. Some of the challenges are as follows crisis of Human Resources, high expectation for excellent quality treatment at lower cost, financial crisis of funds and lack of knowledge [2]. The benefits of adopting E-health are as follows firstly the costs are saved, time is spared and information is shared globally [11]. The Primary Healthcare Centers, Government Hospitals, Private Hospitals and Clinics all clubbed under a single objective of promoting Healthcare [5]. To achieve this objective all the doctors, surgeons and pharmaceuticals must join the initiative to provide world-class facility to the citizens. All the Health Data related to patient is strictly confidential and private so the concerned Security standards providing high level of security which helps in processing Health Data [3]. In Figure 2, The Participants are Government users, Patient users and Healthcare Experts.



**Fig.2.** Participants of E-Health

## **2. E-HEALTHCARE SERVICES IN U.P.**

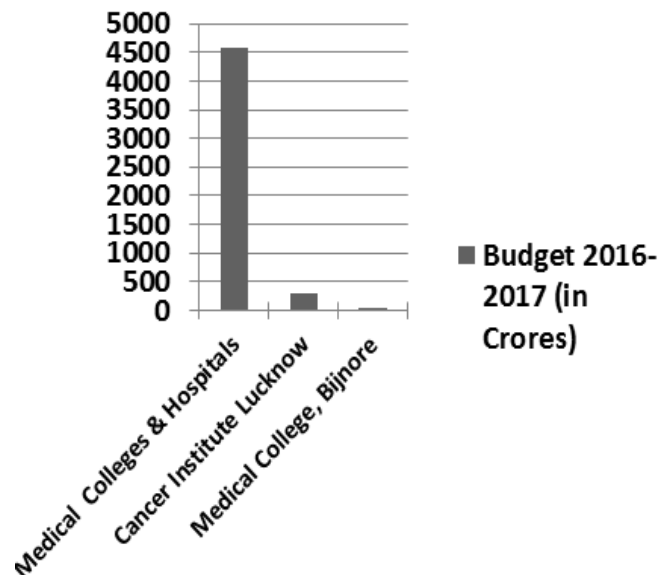
Current Population of Uttar Pradesh is 199581477. According to 2011 census report, it is the most populated state of India and also the third largest state by economy with

the GDP US\$150 billion and along with this the average literacy rate of 67.68% in which it has the male literacy of 77.28% and Female Literacy of 57.18%.

In Table I, the Uttar Pradesh Budget 2016- 2017[13] i.e. planned to be spent on Medical Education is being shown. In total Rs 4922 crore has been granted for Medical Education out of which a Budget of Rs. 4572 crore was granted to state medical colleges and Hospitals. Some details of Hospitals and Colleges are as follows -KGMU, SGPGI etc... An amount of Rs. 310 crore is fixed for the Cancer Institute Lucknow and the provision of Rs. 40 crore made in the budget for setting up of Medical College at Bijnore [12]. In Figure 3, the graphical representation of Table I

**Table 1.** Uttar Pradesh Budget 2016- 2017[13] on Medical Education

Serial No	Budget	Granted to
1.	Rs 4572 Crore	Medical Colleges and Hospitals like SGPGI, KGMU
2.	Rs 310 Crore	Cancer Institute, Lucknow
3.	Rs 40 Crore	Medical College at Bijnore
Total Budget =Rs 4922 Crore		



**Fig.3.** UP Budget on Medical Health

In Table II, the Uttar Pradesh Budget 2016-2017[13] i.e. planned to be spent on Medical and Health is being shown. In the Budget total of 5504.50 Crore Rs were granted to Medical and Health to achieve the following objectives as shown in Table

II, shown in figure 4.

The new department of Telemedicine & Biomedical Sciences is being proposed at SGPGI, Lucknow, and would be in operation in the coming years. In SGPGI, E-Health services are currently in use [10]. UP government got their website in almost every department so that citizen can access information by themselves without any middleman. E-Health helps in exchange of information with the citizens and officials. There will be one to one interaction in between the Health Department and the citizens of the country [6].

**Table 2.** Uttar Pradesh Budget 2016-2017[13] on Medical and Health

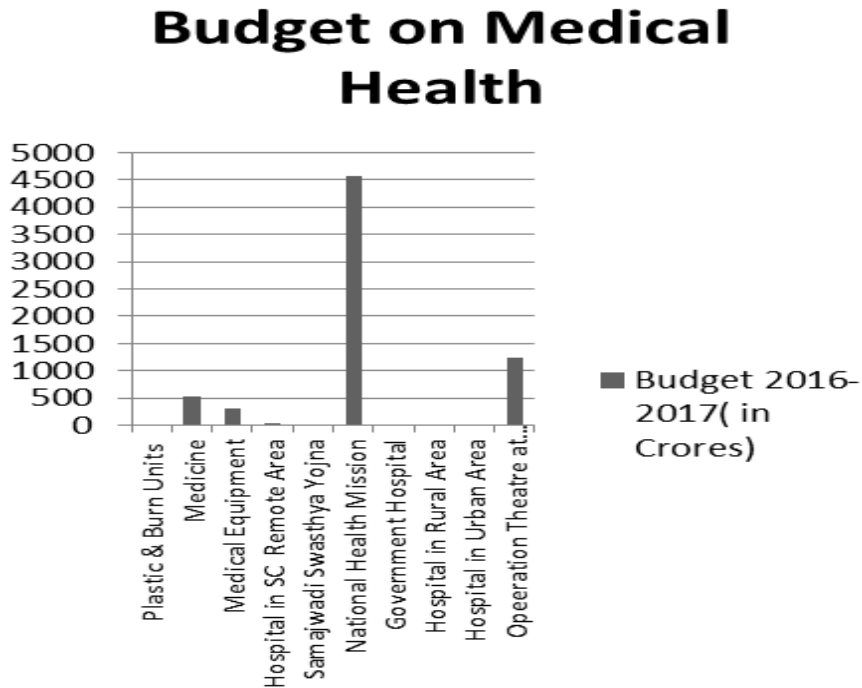
Serial No	Budget	Granted for
1.	Rs. 6 Crore	Plastic & Burn Unit
2.	Rs. 519 Crore	Medicines & Drugs
3.	Rs. 306 Crore	Medical Equipment
4.	Rs. 37 Crore	Hospitals in SC & Remote Areas
5.	Rs. 20 Crore	Samajwadi Swasthya Bima Yojna
6.	Rs. 4576 Crore	Medical Benefits under National Health Mission
7.	Rs. 19 Crore	Government Hospitals
8.	Rs. 10 Crore	Hospital in rural area
9.	Rs. 10 Crore	Hospital in urban area
10.	Rs. 1.50 Crore	Operation Theatre at Jamia Hospital, Varanasi

**Table 3.** Health Profile of Uttar Pradesh

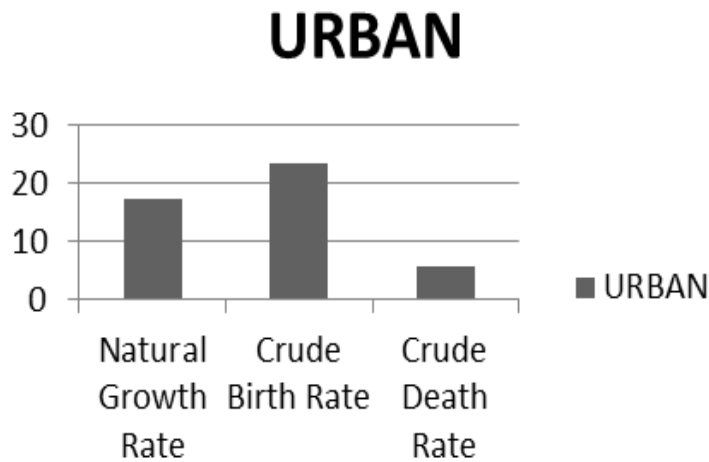
Sl. No.	Indicator	Area	Uttar Pradesh
1	Natural Growth Rate (NGR)	Urban	17.4
2.	Crude Birth Rate (CBR)	Urban	23.3
3.	Crude Death Rate (CDR)	Urban	5.9

The Health Profile of Uttar Pradesh is being shown in Table III [15].The National Family Health Survey Report is prepared by IIPS Bombay. In this, the data is of the National Family Health Survey (N.F.H.S.) is being shown. The Survey NFHS-I has

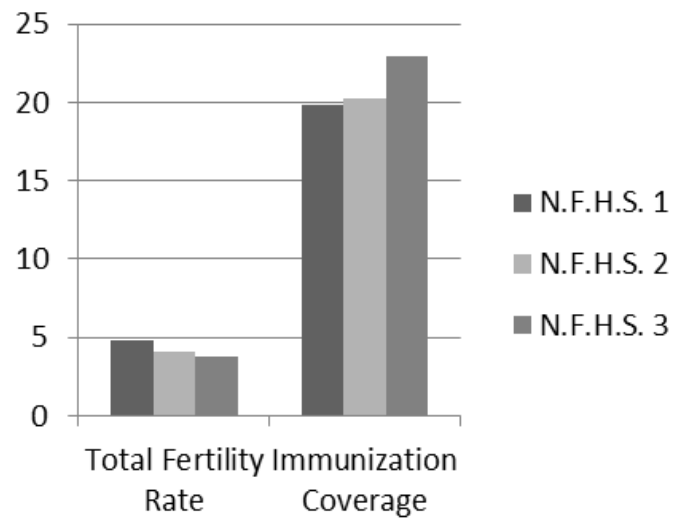
been done in the year 1992-1993, NFHS-II has been done in the year 1998-1999 and NFHS-III in the year 2005-2006[15]. In this Table Natural Growth Rate (NGR), Crude Birth Rate (CBR) and Crude Death Rate (CDR) of urban areas is being shown, i.e. 17.4, 23.3 and 5.9. According to National Family Health Survey I, II & III, the TFR and Immunization Coverage in Children is being shown. In Figure 5 & Figure 6 the graphical representation of the same is being shown.



**Fig.4.** UP Budget on Medical Education



**Fig.5.** NGR, CBR & CDR in urban areas of Uttar Pradesh



**Fig.6.** Total Fertility rate and Immunization Coverage Statistics in National Family Health Survey Report

#### **E- Health Initiatives in Uttar Pradesh [16]**

1. **DVDMS (LMIS) Drugs & Vaccine Distribution Management system**
2. **Uttar Pradesh HMIS**
3. **Human Resource Management System – HRMS**
4. **Hospital Information System**
5. **ASHA Mobile Application**
6. **Sangini Supportive Supervision**
7. **Mobile Kunji – academy**
8. **M-Sehat**
9. **RMNCH Dashboard**
10. **Pyaribitiya – PC & PNDT Website**
11. **Hosla Sajheedari**
12. **NDLM (National digital Literacy Mission) – DISHA**
13. **NHM Uttar Pradesh Helpline CRM**

1. **DVDMS:** In Drugs & Vaccine Distribution Management System the Drug Procurement and Inventory Control is being done. DVDMS is in operation

across UP [16]. It follows the top down approach which helps headquarters in better planning and control. It follows centralized Supply Chain Management. The duration of DVDMS is three years. It requires the following profiles PMU Lead Manager, IT Expert, Supply Chain Expert1 and Supply Chain Expert 2[21].

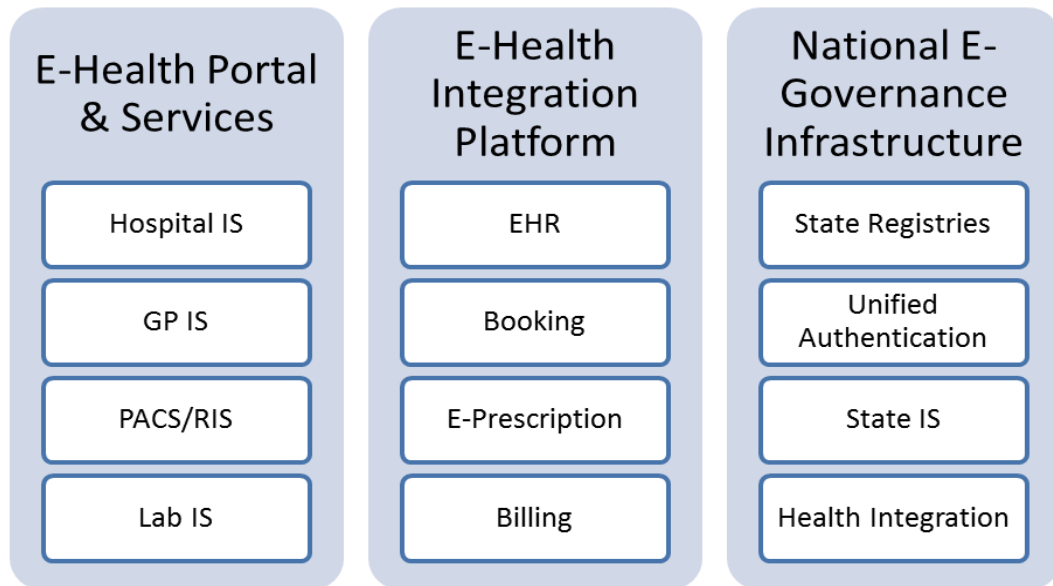
2. **Uttar Pradesh HMIS:** It is a Health Statistics Information Portal. It captures all data requirements of different health programs going in the state. It minimizes the manual and duplication in data capture. Data Visualization technique is being used for review and planning [16]. In this the global Information system based Data Entry is being done [22].
3. **Human Resource Management System-HRMS:** In this initiative of U.P. Government, the human resources would be managed. Uttar Pradesh will migrate to Manav Sampada (Himachal Pradesh NIC developed software) [16]. The Human Resource management system has five steps for enrolment.
  - a. Request will be verified by application administrator.
  - b. User will get token number on registered mobile number.
  - c. On Registration, State Administrator will be created.
  - d. State can login through State Admin.
  - e. User is now the member of HRMS.
4. **Hospital Information System:** In Hospital Information System all the details of Patient Records are being kept. Medicare, Hospital Management software developed by NTSOFT Technologies. It would perpetuate hospital records on an electronic medium whether it is electronic prescriptions, employee & patient records and Medicines inventory. Everything would be maintained online. Its main Objective is to provide an overall Solution for the Hospital, which helps in Effective Management of the Hospital and enhanced Patient Centric Care. The modules related to this Medicare H.M.S. are O.P.D services, I.P.D. services, E.M.R. services, Store records, Account records, Nursing Mgmt. component, Online Management of Medical Store, Blood Bank services and X-Ray & CT-Scan component.
5. **ASHA Mobile Application:** Its full form is Accredited Social Health Activist. It provides counselling of pregnant women, postpartum mothers and their families on pregnancy [24].
6. **Sangini supportive supervision:** It is a support to ASHA. It helps ASHA during home visits and meeting resistant families. It is also known as Training Need Assessment. It follows Peer Review. [25]



7. **Mobile Kunji Academy:** It is designed to facilitate conversation between government and public and use audio visual multimedia materials for better understanding to the masses.[16]
8. **M-Sehat:** It is a mobile based solution which is extendable by design so that features are added and modified as required to fulfil the dynamic needs of stakeholders. It has following features :
  - a. It counsels using IVRS selection
  - b. It has On- Demand audio/ video training.
  - c. Alerts/ Reminders are based on beneficiary lifecycle.
  - d. Proper Scheduling and Planning
  - e. Tracking of Health Beneficiaries Income. [26]
9. **RMNCH Dashboard:** It follows drill up and drill down Technique at different Management levels [16]. Data would be pre- analyzed for decision-making. Simple navigation is done in between the levels and the sections.[27]
10. **Pyaribitiya – PC & PNDT Website:** It is an act to terminate female aborticide [16]. In this the prenatal sex determination and selective sex abortion is being banned.[36]
11. **Hosla Sajheedari:** It is a government organization giving knowledge about family planning in rural and urban areas.[28]
12. **NDLM (National digital Literacy Mission) – DISHA:** In this the Government Health workers are given Digital knowledge about Health.
13. **NHM Uttar Pradesh Helpline CRM:**NHM help line number is (1800-180-1900) with this number, you can file a complaint and can know the status of complaint.[30]

### 3 E-HEALTH MODELS

E- Health services are getting popular day by day and are in huge demand in foreign countries. There is less awareness about e health services in India. Many services like 24\*7 patient care, Electronic Record keeping and Remote Diagnostics of Health-Related information will be in use, if it is being in practice [4]. There are many advantages of using E- Health in day to day life. It can be used in Public Communication during Natural Disasters, Self Education of Health, Patient to Physician Interaction via Mobile Apps and collection of Health Data.



**Fig.7.** E-Health Architecture

In Fig.7. E-Health Architecture is being shown. E- Health Architecture consists of three layers:

1. The First layer is for business users who integrate the system using their business systems. In the first layer of E-Health all the Commercial Portals related to Health can be directly accessed through Hospital IS, Lab IS, PACS/RIS and GP IS [39]. The Hospital IS contains information about the Patient related data, E- prescribing data, and Online Appointment Booking data. In Lab IS all the entry related to Lab Records and Blood Bank records is being maintained.
2. The Second layer is our system which includes all the core models like EHR [38], Booking, E-Prescriptions and E-Billing. Electronic Health Records
3. The third layer is National Electronic-Governance infrastructure. In this there is the unified authentication of digital health records.

#### **4 SCOPE OF E-HEALTH SERVICES IN LUCKNOW**

In the era of digitization, people want everything at ease and at a single click, so as to get information in less time. In Lucknow, Medics super speciality hospital is going to start its operation in May, 2017. This Hospital is located in Alambagh; Lucknow. This was announced in IHWS&A 2016 at Delhi. UP will be having best facility related to health in the future scenario [14]. There are many benefits of e health .Specialists can access information about patients health which help them to give world class treatment. In the case of emergency it is very important to doctors; they can provide

emergency measures to be taken when suffering from a certain health disorder. There are many Hospitals in Lucknow with their running websites. Vivekananda Hospital in Lucknow is providing many free services to the people. It has the first Telemedicine link between rural and urban medical centers through Internet, Mobile phone Facilities like video conferencing etc. The future of Healthcare aims at achieving a global Intent and providing a safer ambiance to all citizens of the country. The International Health Organizations (i.e. W.H.O.) is dedicated to the estimation of the consequences of health with the help of indicators at different levels of population (i.e. Community Level), so with the help of these indications an effective comparison can be done. The Government of Uttar Pradesh is focusing on E-Health and it also focuses on vigilance services and inspection in the field of bioterrorism. The regular surveillance is done to reduce the threats related to the same.

Some Hospitals in Lucknow are using E-Health care Services in their hospitals but not all, if we use the electronic medium it would save our time as well as energy. In very less time we would complete large amount of work. As none of the age old practice is permanent so people must adapt these technologies for country's growth. India has not become a developed country yet. Here people are not ready to accept new Technology [32]. There are many reasons for this People are having access to each sort of technology in urban areas but still they are not using it. Some know about E- Health/ E- Governance services offered by the government and some don't know about it. Most of the hospitals are following the age old manual process of doing work. In the larger Hospitals the patient's records are difficult to access, so Automation of everything is the need of the hour. Major players of E-Health are C.D.A.C., Wipro-G.E., T.C.S and S.I.S.L. C.D.A.C. is one of the pioneers in the domain of E-Health. It's HIS software is presently in use in SGPGI, Lucknow and GTB, Delhi [31]. In the present scenario, the medical graduates and practitioners in many areas are equipped with both E-Health and bring E-medical into practice. The database creation, storage, transfers and archives within a very less span of time have opened new hope for health information sharing and research. Website casting of Health Websites, teleconferencing in different areas of concern and live transmissions of surgeries to any corner of the world has added new dimensions to the field of Medical Science. Efficient health management systems have facilitated delivery of high quality care at lesser costs. Many services like clinical appointments, in-patient services, and management of operation theatres, stores, laboratory and imaging services will help in effective delivery of health care [32].

## **5 CONCLUDING REMARKS AND FUTURE**

The forthcoming future of Healthcare is full of possibilities and will contain the cure of almost every health problem. To achieve this stage, many challenges in this field have to be removed. Some Challenges are as follows. Firstly, articulated & cohesive advancement of healthcare equipment's worldwide. Secondly, consolidation of electronic health and patient-centric care, and lastly, authenticating the software

security concerns and privacy measures. In addition to this there are many challenges faced in implementing E Health Care centers. Some of them are Crisis of Human Resource, high expectation for excellent quality treatment at a lower cost, shortage of funds, Lack of IT Literacy among the users.

E- Health Architecture consists of three layers: First Layer is for business users, the second layer includes core models and third layers national governance infrastructure for authentication of registries. The advantages of using E- Health in day to day life are Communication during Natural Disasters, Self Education about Healthcare, Remote Patient-to-Physician Communication. In this study, we had discussed about the Scope of E-Health care Services in Lucknow, Uttar Pradesh. The Government of Uttar Pradesh is focusing on E-Health and it also focuses on vigilance services and inspection in the field of bioterrorism. The regular surveillance is done to reduce the threats related to the same. In SGPGI Lucknow E-Health is in practice. In Vivekananda Hospital also people can make online appointments and can visit the Hospital according to it. Only some Hospitals are using these services. If it is done at larger scale, it would give better results.

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