

Knowledge based Health Care Recommender System for Rural India Based on Primary Health Centers (PHC)

Shweta Singh, Archana Singh, Gaurav Dubey, Abhishek Goyal

Abstract: Health is a dynamic process which keeps changing. There can be three state of health, good health, sickness or it may be serious illness. Health is very important, we all know that, but sometimes it is not paid much attention. It can be due to lack of knowledge or lack of easy access to the facilities. Health status of rural India shows that rural health care is one of the biggest challenges. This paper presents a system which can provide health care knowledge based on primary health care centers on mobiles, as mobile is increasing its access to rural India and thereby giving boost to the number internet users in rural India.

Index Terms: PHC, Recommender system, India, Knowledge.

I. INTRODUCTION

In India, health care services are provided at two levels: first, at the state level and second, at the central level. Population control, family welfare, quality control of drugs and medical education is taken care of at the central level while the state is more concerned about the public health and hospitals [1]. Primary Health centers (PHCs) are the state owned rural health care facilities in India. Besides regular medical treatment, PHCs in India have some other objective: Infant Immunization programs, Birth control programs, Pregnancy and related care, Anti epidemic program and other emergencies. Despite all these facilities, health status in rural India is a disappointment. There are several factors, which contribute to this poor health status like, in rural and tribal areas, people have their own way of treating diseases (They try not to visit the doctor at their best), lack of ease of access to the hospitals (sometimes they need to travel kilometers to reach hospitals), shyness etc.

II. HEALTH STATUS IN RURAL INDIA

India comes at the second place in terms of population and is the fastest growing economy; still the health sector is facing challenges due to gender, economic and regional disparities. About 75% of the health amenities like medical man power and other health care resources are concentrated in urban areas where only 27% of the population lives [2]. Some facts from the rural areas like life expectancy (63 years), Infant

Mortality rate (80/1000 live births), maternal mortality

rate (438/100000 live births) show that health care in rural India is

a matter of huge concern [3].

India

	Total	Rural	Urban
Birth Rate ¹	22.5	24.1	18.3
Death Rate ¹	7.3	7.8	5.8
Natural Growth Rate ¹	15.2	16.3	12.5
Infant Mortality Rate ¹	50	55	34
Sex-ratio	940	947	926
Population in 0-6 age group	13.12	14.11	10.93
Child sex-ratio	914	919	902
Literacy rate	74.04	68.91	84.98%

(1=SRS 2011)

Figure 1: Comparison between rural and urban health status

Figure 1 shows the difference in health status of urban and rural India. One major factor for this disappointing difference could be, difficult accessibility to public health care and low quality of health care services. This made the people to turn towards local private health care. Private health care is expensive and is unaffordable by low income rural folks [4].

III. CHALLENGES

Public health care efforts made by the government of India have improved the condition since independence, which nearly halved the mortality rate and doubled the life expectancy rate. Despite improved health care services, many of the rural populace dies due to lack of medical attention [5]. The rural areas of India facing challenge in providing better health care services to the people.

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Figure 2: Rural people challenges.

Figure 1 shows the challenges faced by the rural people. These challenges are discussed below in detail.

1. **Affordability:** Best health care is the right of every citizen but the population living in rural areas belongs to low income level. They have financial limitations on their spending, so they try to avoid visiting doctor as much they can. Hospitals are located at distances, so visiting frequently takes transportation charges and they also need to halt their work like farming, labor work or anything.

2. **Accessibility:** Accessibility to health care services is a critical factor in providing effective health treatment to people in rural areas [6]. In rural India, the number of Primary health care centers (PHCs) is limited, located at distances. They need to travel kilometers to reach hospitals and sometimes transportation medium is also not convenient.

Travelling kilometers to reach health centers is very inconvenient for women and elderly people. The total health care utilization is also very low, only half of (52%) of Indian pregnant women receive three or more ante natal checkups; only 43.5% of children in India receive all vaccinations [7].

3. **Awareness:** Population in rural India has their certain beliefs and ways of treating diseases. For example, the old lady in the house, based on her own experience or some traditions, will ask the pregnant women to take care of her diet and overall health. Menstrual education is also not much talked about in rural areas due to shyness, which can lead to many problems. Rural population is also very reluctant to visit doctors as they try to treat many health problems with their local “hakims”. Some tribal groups still believe that diseases are caused by some bad spirits or are a result of bad deeds, so they try to cure it with some magical or religious practices [8].

4. **Quality of health care services:** PHC is the first point of contact in case of health problems in rural areas.

Non-availability of diagnostic tools and increasing reluctance of qualified and experienced healthcare professionals to practice in rural, under-equipped and financially less lucrative rural areas is becoming a big challenge. Only 2% of the doctors work in rural areas where 68% population lives [9].

IV. PROPOSED SYSTEM

In our system we are trying to provide health care services in rural India based on Primary health Centers (PHC) through Smartphone as the Smartphone usage is increasing rapidly in rural areas also. There are approximately 720 million mobile phone users in India out of which 320 million mobile phone users are in rural areas which is around 32% of the rural population. According to Counterpoint Technology Market Research, this is an increase from 22 per cent penetration in 2010. A McKinsey report estimated that by 2015, roughly 75% of the Internet users will mostly access the Internet on their mobile devices, such as smart phones and tablet computers. [10]. so, considering all these facts, it is very advantageous to provide health care services on smart phones. Everything is provided over the internet, but the illiterate or less educated population of rural India is not able to take advantage of it, that can be due to language barrier (as they cannot read English properly) or anything else. This system will provide following functionalities.

1. A system that helps pregnant women to take care of her health: being pregnant in rural areas means, going to have a baby with a sense of helplessness and anxiety. No easy access to health care services, pregnancy is a life threatening situation for both mother and the baby [11]. With the help of our system, the lady can get the complete information of the do’s and don’t’s she must follow during pregnancy, vaccination she needs to take, and care she must take after giving birth.

2. A System that provides complete menstrual education: menstruation is a natural process and is a part of reproductive cycle, but many a times is surrounded by myths and taboos. In rural India addressing social taboos and beliefs regarding menstruation is a biggest challenge, which is often exacerbated by the low girl’s knowledge and awareness about the hygiene and reproductive health [12]. Our system provides a complete knowledge of menstruation, hygiene and reproductive health.

3. **Family Planning:** Family planning is not only about the contraception, but it is important for the complete growth of the family’s financial condition and better health of both mother and the baby [13]. Despite, India being the first country which initiated an organized family planning program way back in 1952, still, in rural areas family planning is not given much attention. The adoption of family planning is strongly related to educational level of women, followed by the age of marriage [14]. Keeping family planning as a major concern in mind, our proposed system provides a complete knowledge of contraception and family health.

4. **Proper care and vaccination details for a new born baby:** Every year around 4 million new born die within 28 days of their birth. Moreover, in terms of numbers India has largest number of child deaths (approx 15 lakh) under the age of five years.

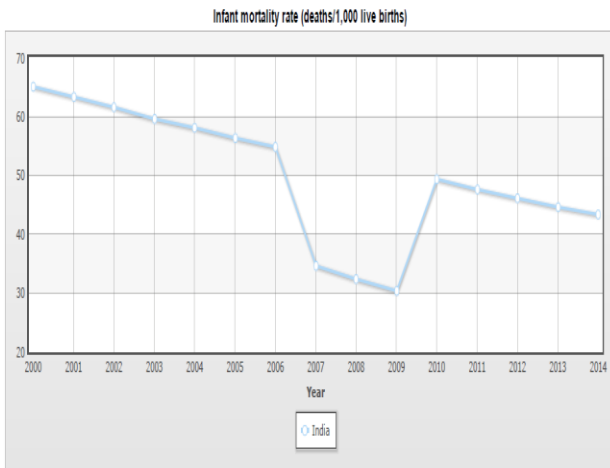


Figure 3: Infant mortality rate year wise [15]

Figure 3 shows the graph for the infant mortality year wise. Providing postnatal care is very critical and also very challenging in rural areas. Our system provides the complete knowledge of new born health care like diet and vaccination.

5. Other medical emergencies: Medical emergencies are unforeseen sickness or injuries which require immediate medical help. A medical emergency can be physiological or psychological, which can pose a threat to person's life or health impairment [16]. Some common emergencies like dizziness, fainting, burns, nausea etc can be treated with first aid at home which can reduce its effect. This system provides with the complete knowledge of first aid that must be provided in case of emergencies.

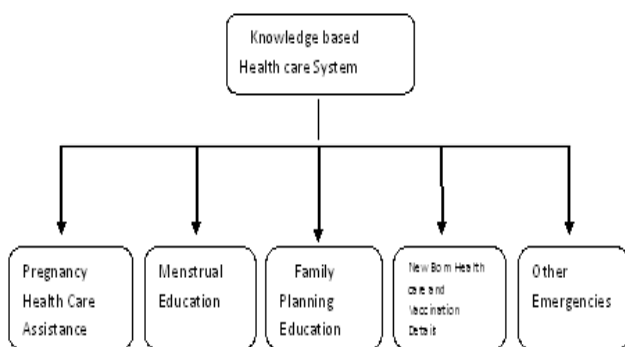


Figure 4: Proposed Health Care recommender System

V. SYSTEM DESIGN

Knowledge based health care recommender system consist of an android mobile application, which is designed on android studio using java and xml language. Following are the screenshots of the designed app:



Figure 5: Main Activity

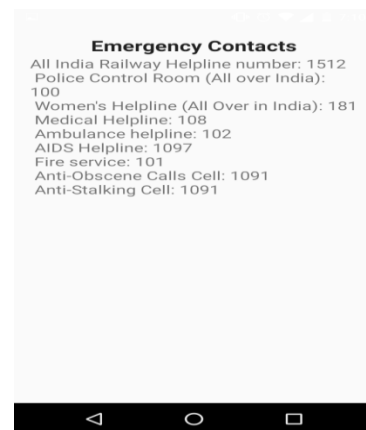


Figure 6: Emergency Contacts Activity

Figure 5, shows the main activity which opens up on clicking the mobile app. Figure 6 shows the Emergency contacts activity, which consists of all the emergency contact numbers, opens up on clicking the first image button.

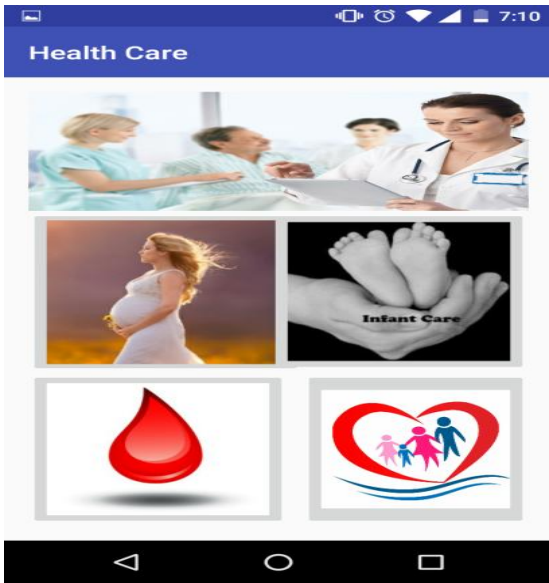


Figure7: Services Activity

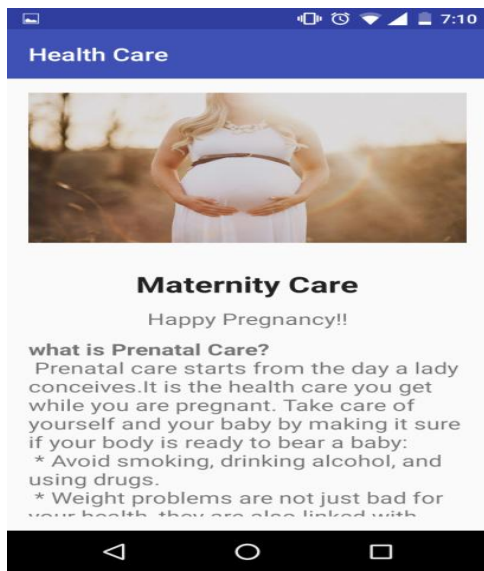


Figure 8: Maternity Care Activity

Figure 7 shows the services activity, which opens up on clicking the services image button of the main activity. This activity consists of four service types which are maternity care, infant care, menstrual education and family planning. Figure 8 shows the maternity care activity, which opens up on clicking the first image button of the services activity. Maternity care activity consists of medical information, do's and don'ts during pregnancy and vaccination details.

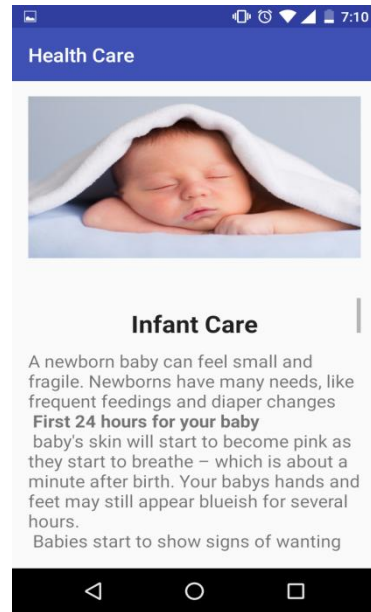


Figure 9: Infant Care Activity

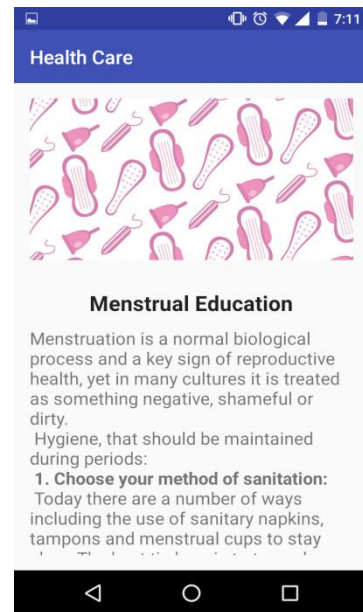


Figure 10: Menstrual Education Activity

Figure 9 shows the infant care activity. As rural India is still struggling with infant mortality, we tried to provide the necessary information from first 24 hours for your baby, vaccination details and growth chart of a baby. This may help spreading awareness about how to take care of a new born. Figure 10 shows the menstrual education activity, which talks about what is menstruation and the hygiene that must be maintained during periods.

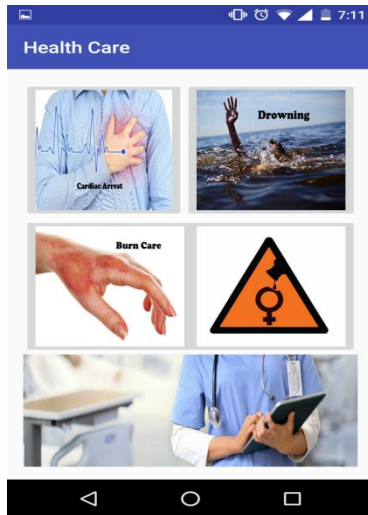


Figure 11: other Emergencies Activity

In rural India, family planning is not given much attention. Through this application we tried to spread awareness about family planning because people in rural areas are hesitant of discussing about family planning. Figure 11, shows the other emergencies activity, which consists of cardiac arrest, drowning, burn care and acid attack. The cardiac arrest activity, gives information about cardiac arrest and how to deal with it at primary level. Figure 14 shows drowning care activity, which talks about drowning and first aid of drowning.



In rural India, open defecation is still a problem. In our daily body care routine, we tried to spread awareness about daily care that must be taken such as oral health, defecation and hygiene. Figure 15 shows the burn care activity, which talks about the degrees of burn and first aid that must be given in case of burn according to the degree of burn. Figure 16 shows acid attack activity, which gives information about the first aid. Acid attack is not given much attention but this

is the sad reality of our society, so we tried to spread awareness about acid attack and first aid of it.

V. CONCLUSION

Despite India emerged as fastest growing economy and a huge amount of budget has been allocated to health care sector, still rural India is posing challenges to healthy India program. Various factors are putting restrictions in providing efficient health care facilities; these challenges are low education level (literacy rate), accessibility, affordability etc. Our system tries to overcome these challenges by utilizing the advantages of smart phones, since smart phones are increasing reach in rural areas, based on primary health care centers. Thus we are trying to provide better health care services by overcoming these challenges, to build a healthy India.

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