

## Redefining primary healthcare with the use of frugal technologies

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Primary Healthcare, by virtue of its definition, refers to the initial point of contact between a patient and a healthcare professional. At its core lies a team of dedicated, qualified, doctors, nurses, diagnostic service providers and pharmacists. Around this lies an ecosystem comprising researchers, innovators, pharmacologists, start-ups, bio-engineers, equipment manufacturers and allied services providers. Working together, these groups of people focus on disease prevention, early detection of health concerns and speedy patient care before chronic health issues spiral out of control.

Primary Healthcare plays a critical role in the detection and management of chronic diseases such as Cardiovascular diseases (CVD), Stroke and Diabetes by reducing morbidity, disability and premature mortality. A Lancet study in 2018 estimated that 1.6 million deaths in India in 2016 could have been averted with adequate primary care services. It is quite likely that many of these were patients who were unable to access healthcare facilities, because of the exorbitant cost.

In India and other developing nations, the prevalence of chronic diseases is on the rise, and the lack of adequate resources and infrastructure makes it challenging to manage them effectively. Without any doubt, there is an urgent need for a robust primary healthcare infrastructure that is affordable, accessible and sustainable. In other words, we need simple, frugal technologies that provide easily accessible health benefits at a lower cost. A few examples of these frugal out-of-the-box technologies that are being used by the healthcare fraternity, to bring relief to patients, are listed below:

### **Telemedicine:**

*Online doctor consultations:* Long commutes to clinics, and overcrowded, overburdened facilities often result in long waits and delays in receiving care. Telemedicine, a relatively recent healthcare provides patients with healthcare at their fingertips. This innovation has bridged the gap between doctors and unwell individuals, through video consultations.

*Mobile Health Apps:* Today, we have mobile apps for diabetes management and CVD to provide education, medication reminders, calorie counting, workout monitoring and remote consultations with doctors, reducing clinic visits and costs.

*Cloud-based ECG:* Affordable, portable ECG devices connected to smartphones, allow healthcare workers in remote areas to send readings to specialists for prompt diagnosis of heart issues, saving time and money.

### **Technology-aided diagnosis and monitoring:**

*AI-powered fundus cameras:* Low-cost, portable cameras with AI algorithms allow eye care workers to detect diabetic retinopathy early, preventing vision loss.

*Bioimpedance devices:* Affordable devices measure body composition and fluid shifts, aiding in early detection of heart failure and preventing complications.

### **Point-of-care testing:**

*Blood glucose monitors:* Inexpensive and readily available, these empower patients to self-monitor their diabetes, improve blood-glucose control and reduce complications.

*Urine test strips for albumin:* These are simple and affordable tools for detecting early signs of kidney damage in diabetics and CVD patients, allowing for timely intervention.

### **Inexpensive AI-enabled monitoring mechanisms**

Artificial intelligence (AI) is transforming healthcare by providing innovative solutions for the diagnosis and treatment of chronic diseases. AI-enabled monitoring mechanisms can be used to monitor patients with chronic diseases and provide real-time data to healthcare providers. This data can be used to identify patients who need immediate medical attention and provide them with timely care. AI can also help in reducing the burden on healthcare systems by providing remote monitoring and care to patients with chronic diseases.

### **Portable radiography**

Portable radiography devices can be used to diagnose and monitor patients with chronic diseases. These devices are inexpensive and can be used in primary care settings. Portable radiography devices can help in identifying patients with chronic diseases and providing them with timely care. They can also help in reducing the burden on healthcare systems by providing remote monitoring and care to patients with chronic diseases.

### **Drone delivery of life-saving equipment**

During the Covid 19 pandemic, several government agencies in India tested drone to distribute vaccines, collect samples and enhance primary healthcare delivery to patients with comorbidities in India's remotest geographies.

## **Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) and Free Drugs Service Initiative of NHM:**

Empowering underserved communities, the Government of India's Ayushman Bharat Health and Wellness Centres integrates screening and distribution of free essential medicines, including insulin, to combat non communicable diseases

### **Community-based interventions:**

*Accredited Social Health Activists (ASHAs):* An important element of India's National Rural Health Mission includes ensuring that every village in the country has a proficient female community health activist, titled ASHA. ASHA is chosen from within the village and accountable to it. She is trained to serve as a liaison between the community and the public health system. ASHA is the first port of call for all health-related issues of deprived sections of rural India, particularly women and children, who find it difficult to access health services.

*Self-help groups:* Peer support groups for diabetes and CVD empower patients by enabling them to share information and concerns, provide emotional support, and manage their conditions through dietary and lifestyle changes. Patients participate in group exercise programs and health awareness sessions. Support groups like these reduce feelings of isolation and boost the self-esteem of patients. Watching others manage their illness and living a good quality of life often acts as an inspiration.

*Mohalla Clinics:* These community-based primary healthcare centres provide free medical consultations, diagnostic tests, and medicines to patients. They are set up in densely populated urban areas and are staffed by qualified doctors and nurses. Mohalla clinics have been instrumental in providing affordable healthcare to people living in slums and other low-income areas. They have also helped in reducing the burden on tertiary care hospitals by providing timely treatment to patients with chronic diseases.

### **Mobile medical units:**

*Bicycle ambulances:* In remote areas, trained paramedics on bicycles reach patients quickly for emergency CVD and stroke care, improving survival rates.

*Medical vans:* These vans are equipped with basic diagnostic tools and emergency care equipment and enable healthcare professionals to visit remote villages, providing access to screening, basic treatment, and referrals for CVD and diabetes.

### **Biotechnology**

Biotechnology has transformed healthcare by providing innovative solutions for the prevention and treatment of chronic diseases. For example, the Biofortification of plants has led to the production of staple crops rich in micronutrients, providing diabetics with diabetes-friendly food. Inexpensive diagnostic tests and treatments have been developed using biotechnology, which can be used in primary care settings. It is also used to develop personalized treatments for patients with chronic diseases, thereby improving their outcomes.

## Internet of Medical Things (IoMT)

The Internet of Medical Things (IoMT) allows connected devices and sensors to monitor patients with chronic diseases 24/7, remotely and provides real-time data to healthcare providers. This data is then used to identify patients who need immediate medical attention. Assisting hospitals in enhancing their operations through increased automation, predictability and cost-effectiveness, IoMT solutions integrating biometrics and predictive maintenance liberate nurses from equipment management and diagnostic interpretation responsibilities. As a result, nurses are empowered to do what they are meant to do - dedicate time to personalized patient care.

**Integration of AYUSH (Ayurveda) and Yoga:** To prevent and contain the increase in the burden of chronic diseases, the Ministry of Health and Family Welfare launched the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). One of the mandates of this program was the integration of the existing healthcare system with the traditional practices and principles of Ayurveda and Yoga for the promotion, prevention and control of non-communicable diseases.

In India, where the healthcare industry ranks among the largest globally, frugal innovations have empowered healthcare providers to deliver cost-effective medical goods and services. We have been able to foster self-reliant healthcare facilities which address multiple needs of patients. These easy-to-implement, frugal technologies have helped improve the outcomes of patients with chronic diseases and reduce the burden on healthcare systems. It is essential to invest in these technologies and promote their adoption to ensure that everyone has access to affordable and quality healthcare.

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Interview with Dr Prabhakaran

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