

Self-Reliance in Advanced Diagnostic Imaging for Accessible, Affordable, and Quality Health Care in India

Accessibility of quality and affordable health care is essential to the well-being of any nation but more so in developing countries such as India. Advanced diagnostic imaging (ADI) is an essential component of today's quality health care; however, it is not affordable to the majority of the citizens. Despite a 137% raise in the union budget allocation for health care in the year 2021–2022 compare to previous year, India still lags behind its health-care expenditure as compared to several major developing economies [Figure 1]. Even in terms of quality index and accessibility to health care, India is ranked 145 among 195 nations (2018 data). It is recommended that spending 10% of its GDP on health care may be optimal for India. While the self-reliance efforts in the pharmaceutical sector has led to availability of affordable and quality medicines, a similar trend in the medical device manufacturing sector is only gaining momentum recently. ADI is one such medical device sector which has contributed to the quality of health care through better and quick diagnosis, as evident from its utility in rapid and reliable diagnosis of the severity of COVID-19 and other life-threatening diseases. Advances in imaging technology have enhanced the quality of images obtained while minimizing the associated diagnostic errors and have considerably improved diagnosis and quality of health care. Magnetic resonance image (MRI) and computed tomography (CT) are two such ADI modalities which continue to play a vital role in providing quality health care despite the issue with their affordability. One approach to address the affordability issue of these ADI is by becoming self-reliant and developing indigenous technology. India is specifically well placed to address these issues considering its global excellence in the area of software development, manufacturing,

technological capabilities with competitive prowess, and resilient mind set to deliver when needed.

The health-care sector is highly dependent on these ADI tools for the management of several health conditions. The majority of currently used MRI and CT machines in India are imported and are very expensive, often beyond the affordability of the majority of the Indian population. In addition, there are also equally expensive annual maintenance costs for the MRI and CT machines. The exorbitant costs of MRI and CT machines are eventually passed on to the patients in the form of high costs per scan. The cost of MRI/CT scan per patient can range from INR 5-25K which is often a significant financial burden to lower and middle income category in India. Besides the affordability issues, repeated exposure to the diagnostic scans can be deleterious; hence, health-care providers must also look into the judicious use of these diagnostic imaging modalities to ensure that annual exposures by patients stays within the limits recommended by the Atomic Energy Regulatory Board (AERB) of India. Despite this being said, when centralized health records are unavailable, effectively documenting and enforcing compliance to the recommendations made by AERB is practically unachievable. Hence, India needs to look at improving its health-care sector by effectively integrating several of its recent national initiatives (digital India, national ID), all of which will require increasing its health-care budget. Indian government should also look at standardizing the CT/MRI scanning cost and protocols nationally, similar to that done recently for stents. This will require an amicable resolution between the union government and concerned private diagnostic associations. While capping the cost of diagnostic imaging can be an interim measure, a sustainable approach to address these issues will be by becoming self-reliant and developing affordable indigenous CT/MRI scanning machines which can be implemented for use even at the grass root level. The local manufacture of the CT and MRI machines will reduce the purchase/maintenance cost and eventually the cost per scanning to the patient. In 2019, about 290 MRI units were purchased across India with a total cost of INR 1778.5 crores. This is a sizeable business opportunity for domestic innovators to get involved.

Currently, Siemens (Germany), GE (USA), and Philips (Netherlands) cater to the market in tier 1 cities, whereas Toshiba (Japan) and Hitachi (Japan) supply the market in tier 2 cities of India. As per the organization of economic co-operation and development at least one MRI machine should be available for every million population. Due to its utility in optimal diagnosis of many diseases and impairment,

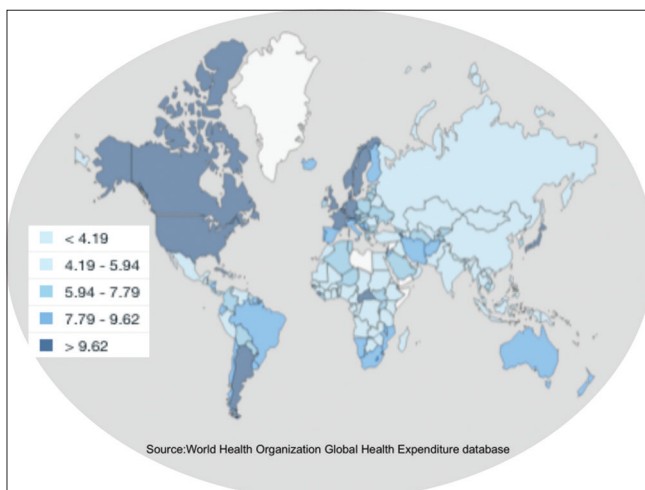


Figure 1: Healthcare expenditure (in 2018) expressed as percent of GDP

the diagnostic imaging equipment's have become an integral part of the hospital settings in India. The medical education regulating bodies in India (Medical Council of India/National Medical Council) have also made it a mandatory requirement to establish ADI machines in all medical colleges. At present, in India, there are 554 medical colleges which are possessing ADI machines almost all are imported with a purchase cost ranging from INR 0.5 to 20 crores. The MRI/CT systems together with the X-rays and ultrasounds modalities continue to contribute to quality health care in India. It is the need of the hour that these diagnostic imaging modalities become affordable at the grass root level to a large segment of the middle and low income population of India. Around 65% of Indian medical equipment manufacturers are local players and cater to meet domestic requirements. India needs indigenous medical equipment development, which not only caters to local demands but also can gain exports to similar developing nations. The government's initiative of the make in India program provides a stage for these sectors to re-explore every possibility to improve the production to meet the demands of today's developing economy. Recently, the central government's production linked incentives scheme for promoting domestic manufacturing of medical devices has provided necessary incentives for domestic companies to manufacture medical devices. Indian medical device manufacturers should utilize these positive developments to take drastic steps to get ready for the manufacture of ADI equipment's. Necessary public-private partnerships with the premier educational establishments should be initiated to address the economic or ecosystem constraint to meet the gaps in diagnostic imaging research to achieve the indigenously developed MRI/CT systems. The major gaps in this area are with manufacturing of essential components such as tubes, magnets, and detectors for CT and MRI machines.

Addressing the challenges on indigenous development of MRI/CT machines, recently the Tata trusts foundation supported by VoxelGrids launched portable MRI machine. The portability of this indigenously developed imaging system allows for its deployment at the grass root level in primary health centers. Necessary support should be provided to establish such indigenously manufactured imaging systems nationally and locally to widen their market share, which in due course will reduce the cost per scan for patients.

Union Government Ministry of Electronics and Information Technology (MeitY) has launched a national mission program for indigenous manufacture of MRI under "make-in-India" plan known as Swadeshi Chumbakiya Anunand Chitran-Ek Rashtriya Abihyaan. MeitY has provided the responsibility for the development of this project to Society for Applied Microwave Electronics Engineering and Research. These recent initiatives should further encourage public-private partnerships to manufacture highly needed indigenously developed ADI systems for the Indian population at grass root levels. These ADI modalities should be made accessible and affordable to all the sectors of Indian population to further improve the quality of health care. The developing economy needs such self-reliance in all manufacturing sectors to achieve economic progress. A long-term vision of self-reliant India (Atmanirbhar Bharat) is possible with thriving local industry in all spheres fuelled by the Indian made technology which is a true growth potential for economic sustenance.

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Submitted: 01-Jun-2021

Revised: 04-Jun-2021

Accepted: 08-Jun-2021

Published: 15-Jul-2021

Access this article online

Quick Response Code:



Website:
www.jnsbm.org

DOI:
10.4103/0976-9668.262960

How to cite this article: Kumar V, Kumar AH. Self-reliance in advanced diagnostic imaging for accessible, affordable, and quality health care in India. *J Nat Sc Biol Med* 2021;12:129-30.