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AI and healthcare technology in India: opportunities, challenges, and emerging trends



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This piece describes the unique opportunities and challenges for artificial intelligence (AI) and digital health technology in India, describes some success stories, and brings up some current trends.

With its vast inequalities in healthcare distribution, glaring lack of trained healthcare clinicians and infrastructure, and low government spending on healthcare, India is one of the countries in the world with the most room for innovative, sustainable and scalable healthcare technology to improve lives. Yet, in a country with 1 billion people, many now equipped with internet connections and smartphones, it is still difficult to name more than a handful of examples of digital technology that have significantly impacted healthcare outcomes or been used widely.

This piece describes the unique opportunities that the system offers, the challenges which prevent small initiatives from scaling up, describes some success stories, and brings up some worrying trends around artificial intelligence (AI) and Indian healthcare.

For India, it is imperative to design and develop technology that takes into account local constraints, among them affordability. There are many local and behavioural challenges in the Indian healthcare sector, but cost is still a key driver. For it to succeed and make a difference at scale, new technology has to be priced for the country and developed to tackle its constraints. The good news is that this is exactly what AI promises. If implemented correctly, AI boils down to redistributing scarce expert knowledge to a large number of beneficiaries by training algorithms machines to replicate this knowledge.

Unique opportunities

There is probably no better place than India to find a problem in need of a creative solution. Around every corner is a new gap to bridge - a skill gap, geographical gap, an infrastructure gap, an urban-rural divide or a spending gap. The diversity and potential scale of the Indian healthcare system affords an opportunity and incentives like no other to pilot and operationalise innovations. Each one of the systems that is a failing for the Indian healthcare system is a unique opportunity for AI or even for simple digital technology.

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The country has witnessed the rapid penetration of internet and smartphones over the last decade and now meets the requirements for efficient delivery of digital solutions. Government enthusiasm for innovation and locally made technology is at an all-time high - both at the central policy level, as well as at local level, with individual states seeking to outdo each other at the adoption of new technology that can help solve old problems. Support for public-private partnerships is high. While this must be tempered by a healthy dose of scepticism about real ground conditions, this is an encouraging sign for innovators.

There are a plethora of healthcare issues that are still 'virgin territory' to technology, each with millions of potential beneficiaries in India. Areas such as antibiotic resistance, health insurance, communicable diseases like malaria and tuberculosis, as well as emerging ones like diabetes are

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a few of the many worth looking at through the lens of the technology, connectivity and artificial intelligence available today.

Challenges

The upside for an innovator in India is that she is very likely to find a use-case and a chance to pilot new technology. However, in a country that is often called 'the land of pilots', the challenge is usually with scaling and distributing technology - even technology that has been proven to be cost-effective and useful. Several pilots of public-private partnerships have been successful. However, none of them has been scaled up to meet India's health challenges.

AI can potentially leapfrog some other technologies, but for AI to be used at any scale, digitalisation is a pre-requisite. Considering that, in many Indian health centres, medical records are still paper, and radiology still uses films (although this is changing rapidly). The pace of this change is rapid, but statistics on digitalisation of records, prescriptions, and radiology are hard to come by.

Healthcare systems everywhere are slower to adopt change than their counterparts in other industries, often with good reason. But in India, it is not only regulation which stifles innovation. Most healthcare services are provided by the private sector and paid for out-of-pocket. This means that to be broadly adopted, technology has to provide a clear short-to-medium term incentive to the private sector, rather than directly aligning with health outcomes. The lack of government spending on healthcare means that public health programmes are still largely funded from outside the country. This sometimes results in importing technology rather than fostering the development of indigenously developed locally appropriate inventions. Medical education in India does not place enough emphasis on research and on keeping up with new developments. Combined with an overburdened system, this results in generations of practicing clinicians with little motivation to innovate or to understand and adopt technology.

Pioneering examples

There are many examples of digital innovation that have demonstrated success in screening, prevention, and treatment in India. For each of these, there are likely dozens of comparable projects ongoing.

Most of the country's healthcare is pre-digital, and paper medical records and film-based radiology are still more common than their electronic counterparts. In this setting, even seemingly simple systems such as an online appointment-booking system at the country's largest public hospitals in New Delhi can have a large impact by sparing patients long waits and saving numerous trips to the hospital for those who can ill-afford to take a day off.

The last decade has also seen some great examples of dedicated hardware and technology that is engineered for the unique challenges of Indian health ecosystem. These include products for tuberculosis medication adherence monitoring (one of India's most significant public health issues), low-cost vital parameter monitors for use in the primary healthcare setting, and telemedicine programs that provide clinical expertise to areas without doctors. These are more mature than the artificial intelligence applications, which have begun to emerge over the last 5 years. Primarily used for screening, monitoring, and diagnostic assistance, AI applications include algorithms that analyse chest X-rays and other radiology images, read ECGs and spot abnormal patterns, automatically scan pathology slides and even assess fundus images for signs of retinopathy.

Certain branches of medicine in India have been more successful than others at fostering the development of innovation and adopting it. Ophthalmology is a clear leader on both these counts, with a relatively broad range of innovative technologies - high-quality imaging of both retina and cornea using smartphone-coupled devices, artificial intelligence for the screening of diabetic retinopathy - being developed and tested, and then brought into clinical use. This has largely been due to private-sector efforts and would not have been possible without the foresight shown by a set of well-organised large private eye care centres in the South of India that facilitated the data collection and piloted the new technologies.

Worrying trends

As the official use of healthcare electronic medical records and secure electronic means of aggregating and transferring medical data is gradually being adopted, an alternative is quickly taking its place. Indians are prolific users of the free messaging application 'Whatsapp' and doctor-patient communication and even inter-clinician communication by Whatsapp is frequent, with the medium used regularly by groups of clinicians to share and consult on cases.

A second, perhaps even more concerning trend for AI, in particular, is that India is starting to be seen as a 'data source' for radiology and ophthalmology images, and perhaps more. A combination of factors, including English-language reporting, privately owned healthcare systems and lax privacy, data protection and ownership laws. The data sharing itself may or may not be a cause for worry - but the lack of transparency and regulation around it certainly should raise red flags.

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Current and future

The last 5 years in India have seen consumer-facing 'health tech' being talked about and embraced by investors, by the government and gradually by the public. Technology aimed at the urban, educated consumer is gaining traction, mostly in the form of online health service aggregators, telemedicine, e-commerce for home delivery of pharmaceuticals and a wave of fitness apps. Existing methods are also being used to reinvent healthcare delivery in the form of online consults or chat-based basic healthcare service apps.

More recently, physician-facing digital healthcare tech has begun to make its appearance - such as technology that performs or assists with core healthcare or medical tasks like analysing radiology, pathology or ophthalmology images.

Conclusion

The significant need for technology to bridge resource gaps in India, and the potential of AI to offer affordable solutions at scale means that India may soon be poised to realise the benefits of these technologies on health outcomes.

Key Points

- Innovative, sustainable and scalable artificial intelligence technology has the potential to greatly improve healthcare outcomes in India
- AI applications being developed and deployed in India include algorithms that analyse chest x-rays and other radiology images, read ECGs and spot abnormal patterns, automatically scan pathology slides and assess fundus photographs for signs of retinopathy.
- Scaling up and distributing technology in India is challenging

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