Review Article

Mapping of Health Technology Assessment (HTA) teaching and training initiatives: Landscape for evidence-based policy decisions in India

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Abstract

Demographic transitions accompanied with epidemiological shifts are affecting many countries around the globe. These apprehensions have raised the concern for constructing and sustaining healthcare systems especially among resource-constrained low- and middle-income-countries (LMICs) such as India. Introducing Health-Technology-Assessment (HTA) in the educational initiatives could support planners and policy-makers in formulating evidence-based-decision-making along with tackling inequalities/inefficiencies and promoting cost-effectiveness in resource allocation. A mapping exercise has been undertaken for examining the feasibility and implementation of HTA curriculum in the existing courses in India. To gain best possible insight on HTA curriculum, a situational analysis was conducted using systematic search strategy through search engines such as Google, Google Scholar, ProQuest and PubMed. Currently, seventy-one institutes in India are offering one or more courses through regular mode at undergraduate/postgraduate/diploma-certificate/doctorate-level pertaining to Medical-technology (MT), Biostatistics (BS), and Health-economics (HE). MT was offered in 37 institutes (52.12%), followed by BS in 23 (32.39%), and HE in nine (12.67%). Only two institutes (2.81%) are offering certificate-courses on HTA, mainly confined in virtual modules. This review reveals noticeable gaps in the existing curriculum in India and necessitates a novel academic initiative by introducing HTA in a full-fledged manner. Reforms in the research and educational initiatives need to be brought for promoting awareness regarding HTA. The application of domain needs to be widened from the field of health-policy formulators to research and teaching. This should be further strengthened with the strong academic collaborations to generate replicable findings, address challenges, and offer solutions for existing threats to HTA.

Keywords: Health technology assessment, India, mapping, public-health, teaching

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Introduction

Healthcare systems in developing countries are confronted with various challenges for improving the quality of healthcare along with minimum economic-burden on the households. There is evidence of increased demand for healthcare services,

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predominantly attributed to demographic and epidemiological transitions.[1,2] Increased share of reliant population, higher burden of NCDs coupled with other emerging diseases and higher costs are affecting many countries around the globe.[3] These apprehensions have raised the concern for constructing and sustaining healthcare systems especially among the resource constrained low- and middle-income countries (LMICs) such as India.

Substantial progress has been attained toward achieving Universal Health Coverage (UHC) along-with Sustainable Development Goals (SDGs).[4] The country has witnessed sound economic growth and improvement in the major health indicators. However, public spending on healthcare remained abysmally low, resulting in high out-of-pocket expenditure (OOPE) and considerable health-disparities across the country.[5,6] The mounting cost of healthcare services in India has surpassed the allocated budget for healthcare, which was one of the lowest in the world, i.e., about 1.3% of Gross Domestic Product (GDP).[7] Recently, the Government of India (GoI) has unveiled various social-security programmes with the purpose of attaining UHC by targeting SDGs.[8] Investing on cost-effective health technologies in India would be critical in the process of decision-making and providing equitable health to its population.[9-11]

Literature highlights on synthesizing the existing evidence for supporting healthcare decisions among clinicians, decision makers, and community.[11-19] An initiative in health care decision-making such as evidence-based medicine (EBM) and comparative effectiveness research (CER) have emerged as a response from clinical/evidences.[20-22] However, the decision-making process in health care is a complex and dynamic process which involves the interplay of various factors. These complexities have paved the way for the introduction of health technology assessment (HTA) as a combination of multidisciplinary fields.[23]

HTA provides a globally accepted and structured approach on socioeconomic factors, medical devices and technologies, programmes and policies, and various ethical challenges involved in the adaptation/introduction of health technology in a more systematic, apparent, equitable, and vigorous manner.[11,12,22,24] It could be used to build a bridge between academic research and real-world decision-making. Currently, few countries have already initiated the inclusion of HTA in their academic curriculum as a module which is offered on both real and virtual platforms. Few of the academic institutions have also established HTA as a specialization in their academics/research domains.[25-29]

Major initiators of HTA modules were developed countries who are confronting lesser healthcare challenges as compared to the LMICs. Introducing HTA in the health policy space of India will create an opportunity to systematically assess the performance of the health system. It will also help in strengthening the availability of required health information and inputs required for HTA. Efficient generation and deployment of data is a prerequisite for HTA.[27,28] Introducing HTA in curriculum will guide the researchers to focus on the information which is crucial in nature and prioritizing the health goals for strengthening the database and health system as a whole.[29]

The Ministry of Health and Family Welfare (MoHFW) has introduced a new initiative, i.e., health technology assessment in India (HTAIn) to strengthen evidence-based service delivery through the Department of Health Research (DHR).[30] They have designated few of the medical/public health research institutes in India as regional resource-hubs for HTAIn to cater the regional priorities along with evidence-based health policy decision-making/implementation.[30,31] Literature indicates that studies conducted under the HTA will be helpful in providing better primary care from the grassroots level. The results obtained from the HTA will be also relevant for the practice of primary care physicians as they can take evidence-based-decisions. This will not only help the physicians but also the general population and the Government at the broader level to maximise the outreach of various programs and minimise the cost associated with the health programs and policies. HTA can offer robust evidence-based approaches to make clear, informed policy-making and recommendations regarding the application of health technologies for the patients, which can significantly improve the overall performance of the healthcare system.[32-34] Despite these prospective advantages, initiatives, and policy goals, HTA has not rooted firmly in the educational institutes to promote research by scientific methods. In India, HTA is not yet introduced as a complete curriculum which could be imparted through regular mode for strengthening the public health practitioners/policymakers for healthcare decision-making. In this study, we have highlighted how introducing HTA as a full-fledged module in the educational institutes can assist the government as well as the policy makers in effective priority setting for health sector reform and achieving UHC.

Methods

Search was conducted systematically through search engines such as Google, Google Scholar, ProQuest, and PubMed databases up to February 18, 2019. A set of keywords "Health Technology" or "Health Technology Assessment" or "Health Technology Assessment in India" paired with "teaching" or "training" and "teaching and training" consisting of single/combined terms has been used for the purpose of search. Also, secondary references from the literature have been reviewed along with the reference list of publications.[33-35] These included medical, medical technology (MT), HTA, educational courses; clinical and hospital administration/management; healthcare teaching; biostatistics (BS); health-economics (HE); and public health. The websites of the Indian Council of Medical Research (ICMR), the All India Institute of Medical Sciences (AIIMS), the Medical Council of India (MCI), the Indian Nursing Council (INC), the Universities Grants Commission (UGC), the Association of Indian Universities (AIU), along with the Ministry of Health and Family Welfare (MoHFW) were also searched to explore the courses offered on HTA. Searches were also made on the websites

of the Indira Gandhi National Open University (IGNOU), other medical/health/educational institutes, and the World Health Organization (WHO).

Our searches were confined to the courses offered solely in India or in collaborations with other foreign institutes/universities, if any. Further, no restrictions have been applied in terms of duration, type of the degree, and certification awarded on the successful completion of these courses.[36] Comprehensive information on the courses have been obtained through the concerned institutes or from their designated websites. In case of lack/unavailability of information on the mentioned websites of the concerned institutes, personal/telephonic contacts have been established with the universities/institutions for the detailed information.[37]

After completing the thorough searches, we have excluded seminars/workshops and short-term courses/training programmes having duration less than 4–6 weeks. Additionally, we have also conducted a systematic review of the curriculum of these academic programmes to understand the content/context of HTA teaching/training at the undergraduate, diploma, postgraduate, and doctoral levels. The syllabi of community medicine in undergraduate courses, dentistry, nursing, and allied health sciences were also examined to landscape the contents linked to HTA. Similarly, masters/diploma courses in public health, and hospital administration/management were also surveyed to locate the inclusion of HTA as a component in these courses.[38]

However, present study does not investigate the courses on HTA which have been offered as a part of clinical research, business management, and study programmes in other life sciences. The courses/modules were categorized for information in followings: (i) whether HTA is a part of the teaching curriculum; (ii) what is the mode of delivery; (iii) what are the broader contents (iv) which instructional methods have been engaged for teaching; and (v) what are the eligibility criteria for the selection. The relevant characteristics such as duration of courses, institutions, modes of teaching, targeted groups, and focused themes of courses were tabulated.

Results

Present study systematically explores the existence of HTA as a component, which is offered in various academic programmes/courses related to MT/BS/HE/HTA in India. MT/BS/HE as a subject is offered at various academic levels ranging from certificate courses, undergraduate, postgraduate, postgraduate diploma, and at the doctorate level. Major subdomains and specializations under the broad umbrella of medical science are Mathematical and BS, HE, MT, Health science and quality-control, and Health education. There are currently 69 institutes, centers, and universities in India that are offering one or more of these courses, mostly as a regular module [Table 1 and 2].

The most common subfields are (1) MT offered by 52.12% (n 37) of the medical and academic institutes, (2) BS, (n 23) offered by 32.39% of universities, colleges of science and medical institutes, (3) HE, offered by 12.67% (n 9) medical/research and technological institutes; and (4) HTA which is only offered by 2.81% (n 2) at the virtual platform by two medical institutes all over India. The courses were taught mostly in two modes, i.e., class room teaching and virtual platforms. Majority of these courses which varied significantly in time duration at each level were offered in class room teaching, i.e., 95.77% (n 68).

Generally, the undergraduate degree in India is obtained in three years, postgraduation in two years, certificate and diploma courses vary between six months to two years in traditional manner. The MPhil and PhD programmes range between 1–5 years and completion of these programmes significantly depends upon numerous factors.

The eligibility criterion for these courses also varies as per the universities, institutes, and organizations which are offering them. Generally, the candidates opting for undergraduate courses were selected with a minimum qualification of 10+2 with science as a major subject. For postgraduate courses in MT/BS/HE, candidates with MBBS/Statistics/Economics and others were eligible to apply as per the eligibility criteria of the offering institutes. Further, for applying in certificate courses for the above-mentioned subjects, the candidate needs to have a minimum qualification of 10+2 degree in science [Table 1 and 2].

HTA has not emerged as an independent discipline in any of the universities or institutes across India [Figures 1 and 2]. HTA is mainly offered at the virtual platform as a minor component in two institutes, where duration of the teaching was confined within six months' period. This situation clearly indicates the gaps currently existing in the Indian educational system in terms of dedicated educational initiatives for HTA. Interestingly, HTA is offered virtually as a short-term training module by only two medical/research and educational institutes but there is no academic degree or subfield/specialization in the map of educational teaching and training. The instructions in HTA have been integrated into various other programmes and these programmes also differ with respect to their focus, approach, contents, and most importantly the duration. The eligibility criteria for the selection of students/trainees are not clearly indicated and mentioned.

Discussion

Public health research in India has augmented over the years, though the qualities of these studies are still debatable. Limited numbers of studies are available on economic efficacy, cost-effectiveness/benefits, system cost, public policy perspectives, and evidence data synthesis in India.[37-39] Health being a state subject drives the decision/implementation of health policies at the state level. Central government being primarily centralized in structure involves multiple stakeholders, who can also support states as a facilitator in medical

Table 1: Academic programmes on medical technology & health technology assessment at graduate, masters and other levels in India

BSc (Medical technology)						
Center	**University**	**Location**	**Eligibility**	**Certification**	**Duration**	**Mode of Delivery**
Northern Regions						
Baba Farid College	Panjab	Punjab	10+2 from a recognized University	BSc	3 Years	Regular
Govt Medical College, Amritsar	Guru Nanak Dev	Punjab	10+2 from a recognized University	BSc	3 Years	Regular
Adesh Institute Of Medical Science & Research, Bathinda	Baba Farid University of Health Sciences	Punjab	10+2 from a recognized University	BSc	3 Years	Regular
Lovely School of Technology & Computer Applications	Lovely Professional	Punjab	10+2 from a recognized University	BSc	3 Years	Regular
Luxmi Bai Institute of Dental Sciences & Hospital	Baba Farid University of Health Sciences	Punjab	10+2 from a recognized University	BSc	3 Years	Regular
Postgraduate Institute of Medical Education & Research Chandigarh	Dr. Babasaheb Ambedkar Technological	Punjab	10+2 from a recognized University	BSc	3 Years	Regular
St. Soldier Group of Institutions Jalandhar	Guru Nanak Dev	Punjab	10+2 from a recognized University	BSc	3 Years	Regular
Hindu Girls College	Maharshi Dayanand	Haryana	10+2 from a recognized University	BSc	3 Years	Regular
Dyal Singh College, Karnal	Kurukshetra	Haryana	10+2 from a recognized University	BSc	3 Years	Regular
Government College Baundkalan, Bhiwani	Maharshi Dayanand	Haryana	10+2 from a recognized University	BSc	3 Years	Regular
MM Institute of Medical Sciences & Research	Maharishi Markandeshwar	Haryana	10+2 from a recognized University	BSc	3 Years	Regular
Mukand Lal National College	Kurukshetra	Haryana	10+2 from a recognized University	BSc	3 Years	Regular
Baddi University of Emerging Science & Technologies	Babasaheb Bhimrao Ambedkar Bihar	Himachal Pradesh	10+2 from a recognized University	BSc	3 Years	Regular
All India Institute of Medical Sciences	AIIMS, Delhi	Delhi	10+2 from a recognized University	BSc	3 Years	Regular
Chanderprabhu Jain Institute of Management & Technology	Guru Jambeshwar	Delhi	10+2 from a recognized University	BSc	3 Years	Regular
University College of Med. Sciences & G.T.B. Hospital	University of Delhi	Delhi	10+2 from a recognized University	BSc	3 Years	Regular
Jamia Hamdard University	Jamia Hamdard	Delhi	10+2 from a recognized University	BSc	3 Years	Regular
Combined Institute of Medical Science & Research	Hemwati Nandan Bahuguna Garhwal	Uttarakhand	10+2 from a recognized University	BSc	3 Years	Regular
ICFAI Institute of Science And Technology Dehradun	Institute of Chartered Financial Analysts of India (ICFAI)	Uttarakhand	10+2 from a recognized University	BSc	3 Years	Regular
The Himalayan Institute of Medical Sciences	Himachal Pradesh	Uttarakhand	10+2 from a recognized University	BSc	3 Years	Regular
Western Regions						
Keshavji Bharmal Sumaria Commerce & Nataraj Professional Sciences College	Veer Narmad South Gujarat	Gujarat	10+2 from a recognized University	BSc	3 Years	Regular
Asian Institute of Health Sciences	Manipal	Maharashtra	10+2 from a recognized University	BSc	3 Years	Regular
Eastern Regions						
Satyendra Narayan Sinha Institute of Business Management	Ranchi	Jharkhand	10+2 from a recognized University	BSc	3 Years	Regular
Haldia Institute of Allied Medical & Health Sciences	Vidyasagar	West Bengal	10+2 from a recognized University	BSc	3 Years	Regular
Southern Regions						
Maharajah Institute of Medical Sciences	Dr. N.T.R. University of Health Sciences	Andhra Pradesh	10+2 from a recognized University	BSc	3 Years	Regular
P E S Institute of Medical Sciences And Research	Dr. N.T.R. University of Health Sciences	Andhra Pradesh	10+2 from a recognized University	BSc	3 Years	Regular
SVS medical college	Dr. N.T.R. University of Health Sciences	Telangana	10+2 from a recognized University	BSc	3 Years	Regular

Contd...

Table 1: Contd...

Center	University	Location	Eligibility	Certification	Duration	Mode of Delivery
BSc (Medical technology)						
Kamineni Institute of Medical Sciences	Dr. N.T.R. University of Health Sciences	Telangana	10+2 from a recognized University	BSc	3 Years	Regular
Chennai Medical College Hospital & Research Institute	Sri Ramaswamy Memorial	Tamil Nadu	10+2 from a recognized University	BSc	3 Years	Regular
St. John's Medical College	Rajiv Gandhi University of Health Sciences	Karnataka	10+2 from a recognized University	BSc	3 Years	Regular
Karnataka State Open University College	Karnataka State Open	Karnataka	10+2 from a recognized University	BSc	3 Years	Regular
Presentation College of Applied Sciences	Mahatma Gandhi	Kerala	10+2 from a recognized University	BSc	3 Years	Regular
MSc (Medical technology)						
Sher-I-Kashmir Institute of Medical Science	Deemed	Jammu-Kashmir	Any graduation	MSc	2 Years	Regular
BN Patel Institute of Paramedical And Science	University Grand Commission	Gujarat	Any graduation	MSc	2 Years	Regular
Veer Narmad South Gujarat University	University Grand Commission	Gujarat	Any graduation	MSc	2 Years	Regular
Symbiosis Institute of Health Science	Deemed	Maharashtra	Any graduation	MSc	2 Years	Regular
Symbiosis International Institute	Deemed	Maharashtra	Any graduation	MSc	2 Years	Regular

Source: Searched and complied by the authors

education/managing regulatory bodies and other activities. The potential use of HTA curriculum could be for evidence-based healthcare decision-making, policy formulators, innovators, and Government of India.[40]

Except government, other identified relevant/potential stakeholders in the HTA can be medical institutes, research and development (R & D) organizations, pharmaceutical industry, insurance companies, and healthcare providers. India has recently embarked on the journey of introducing HTA for evidence-based informed policy making.[30-39] Having widespread regional variations in health parameters across the country, it is going to be a herculean task to implement the results from HTA as a nationally representative figure.

Findings from the present study reveals that in spite of having various healthcare challenges which meticulously require HTA involvements, especially in providing better primary care, India lacks rigorously in formal educational and training initiatives on HTA.[40] Introducing HTA among the major educational institutions can specifically address the regional as well as state specific healthcare challenges by strengthening the education and training courses.[27-30,41] Results indicate that an infinitesimal segment (2.81%; n 2) of the institutions are offering HTA with the constraint of virtual training. It will strengthen the capacity building for the targeted trained manpower in tackling these health care concerns, increasing the transparency, inclusiveness, and accountability of the process across various states and regions in India. The cornerstone of these modules would contribute in the advancement of virtuous training along with addressing the essential needs of the workforce with required skills.[42-47] It will also reduce the excessive reliance on external experts and resource-persons by enabling the potential researchers involved in the learning pedagogy of HTA.

The infusion of various domains in HTA not only offers it an added advantage but also ascribes it a distinct/unique identity to provide appropriate solution to the public-health problem. Establishing HTA as a full-fledged educational module among academic, teaching and training, and research institutes in India would create and reinforce the healthcare system. Further, it will also enable the workforce to contribute in an evidence-based-monitoring and instrumentation of various public-health programmes, policies, and decision-making processes.[15,48-52]

In India, about 2 to 3% share from the GDP was apportioned for the education sector, which needs to be increased for development and promotion of educational endeavors in HTA curriculum.[40] Further, keeping in view the major healthcare concerns among the LMICs, there is a need for the promotion of HTA as a regular discipline by highlighting its progressive effects on public health practices and quality of care among the community.[53-56] The implementation of HTA curriculum prerequisites resources such as sustained institutional and university commitment along with manpower and financial commitments.

Evidence from various countries with existing HTA modules also emphasizes on curriculum based common standards for educational initiatives and quality and training assurance implementation of community-based strategies for efficient,

Table 2: Academic programmes on Biostatistics and Health economics at graduate, postgraduate, PhD, and other levels in India

Biostatistics (Graduate level)						
Center	**University**	**Location**	**Eligibility**	**Certification**	**Duration**	**Mode of delivery**
Malwa Degree College	Punjabi	Punjab	10+2 standard	BSc	3 Years	Regular
KV Pendhakar College of Arts, Science, and Commerce	Mumbai	Maharashtra	10+2 standard	BSc	3 Years	Regular
Government Degree college	Kakatiya	Telangana	10+2 standard	BSc	3 Years	Regular
St. Marys College	Calicut	Kerala	10+2 standard	BSc	3 Years	Regular
Gems Arts and Science College	Calicut	Kerala	10+2 standard	BSc	3 Years	Regular
(Masters, diploma and other levels)						
Lucknow University	Lucknow	Uttar Pradesh	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
Lucknow University	Lucknow	Uttar Pradesh	Any graduates with Mathematics as one subject	MA	2 Years	Regular
Kavitha Memorial Degree and PG College	Kakatiya	Telangana	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
Christian Medical College	Dr MGR Medical	Tamil Nadu	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
National Institute of Epidemiology	Madras	Tamil Nadu	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
The Tamil Nadu Dr MGR University	Dr MGR Medical	Tamil Nadu	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
SDNBV College of Women	Madras	Tamil Nadu	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
Madurai Kamraj University	MKU	Tamil Nadu	Any graduates	PG Diploma	1 Years	Regular
Manipal Academy of Higher Education	MAHE	Karnataka	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
National Institute of Mental Health and Neuroscience	NIMHANS	Karnataka	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
NITTE	Deemed	Karnataka	Any graduates	Certificate course	6 Months	Regular
Kerala Veterinary and Animal Science University	KVASU	Kerala	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
Mahatma Gandhi University	MGU	Kerala	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
St. Thomas College	Mahatma Gandhi	Kerala	Any graduates with Mathematics as one subject	MSc	2 Years	Regular
(Doctorate level)						
Indian Veterinary Research Institute	IVRI	Uttar Pradesh	Post graduates in Statistics/ Mathematics	PhD	5 Years	Regular
Rama University	Rama	Uttar Pradesh	Post graduates in Statistics/ Mathematics	PhD	5 Years	Regular
Rajendra Memorial Research Institute of Medical Sciences	RMRIMS	Bihar	Post graduates in Statistics/ Mathematics	PhD	5 Years	Regular
National Institute of Mental Health and Nuero Science	NIMHANS	Karnataka	Post graduates in Statistics/ Mathematics	PhD	5 Years	Regular
Health Economics (Masters, diploma and other certificate level)						
Center	**University**	**Location**	**Eligibility**	**Certification**	**Duration**	**MoD**
Post Graduate Institute of Medical Education & Research	PGIMER	Punjab	Master's degree in any discipline	Certification	3 Months	Online
Indian Institute of Public Health	IIPH, Delhi	New Delhi	Bachelor's degree/Master's degree in any discipline	MPH	1 Years	Regular
Indian Institute of Technology	IIT Kanpur	Uttar Pradesh	Master's degree in any discipline	Certification	2 Months	Regular
Indian Institute Of Health Management Research	IIHMR	Rajasthan	Bachelor's degree/Master's degree in any discipline	Certification	2 Months	Regular
Indian Institute of Public Health	IIPH, Gujarat	Gujarat	Bachelor's degree/Master's degree in any discipline	MPH	2 Years	Regular

Contd...

Table 2: Contd...

Biostatistics (Graduate level)						
Center	**University**	**Location**	**Eligibility**	**Certification**	**Duration**	**Mode of delivery**
Indian Institute of Public Health	IIPH, Gujarat	Gujarat	Bachelor's degree/Master's degree in any discipline	MHM	2 Years	Regular
Indian Institute of Public Health	IIPH, Hyderabad	Telangana	Bachelor's degree/Master's degree in any discipline	MPH	2 Years	Regular
Christian Medical College	Dr MGR Medical	Tamil Nadu	Bachelor's degree/Master's degree in any discipline	PG Diploma	1 Years	Regular
Manipal Academy of Higher Education	MAHE	Karnataka	Bachelor's degree/Master's degree in any discipline	MSc	2 Years	Regular
Certificate course on HTA						
School of Public Health	PGIEMR	Punjab	Any graduation	Certificate	6 Months	Online
Amrita Institute of Medical Science (Joint With Ruskin University, UK)	Amrita Vishwa Vidyapeetham	Kerala	Any graduation	Certificate	3 Months	Offline

Source: Searched and complied by the author

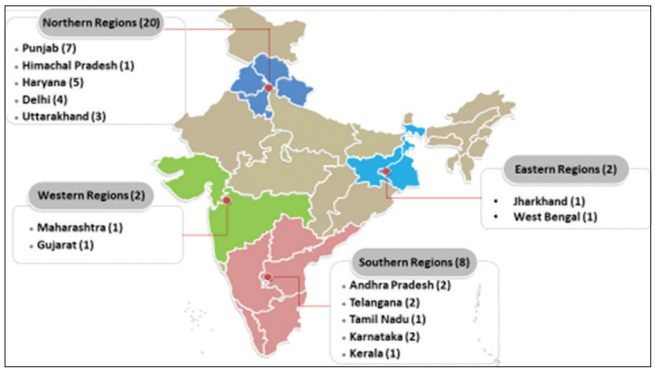

Figure 1: Layout of the curriculum of B.Sc. Medical Technology in India
Source: Created by the authors

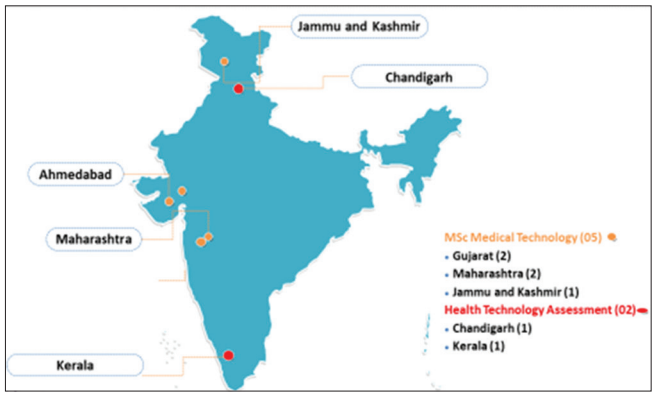

Figure 2: Layout of the curriculum of Medical Technology and HTA in India (M.Sc. and certificate courses on HTA)
Source: Created by the authors

productive, and skilled manpower.[26-30] Initiation of HTA curriculum requires the involvement of numerous stakeholders, extensive capability building of the existing and potential workforce, and improved infrastructure.

Introducing full-fledged courses would be the best for implementing HTA in India. It could be initially incorporated in the integrated curriculum for master's level public health programmes offered by ICMR and other medical/academic institutions. Further, virtual and distance learning initiatives could be also undertaken for skill-based HTA education, as these programmes would be more flexible, intensive, and responsive to changing demands of its learners.

The probable employment opportunities could be explored locally, nationally, and internationally in various organizations in the area of healthcare. Also, nongovernmental organizations (NGOs), medical colleges and hospitals, pharmaceutical industry, state and centrally run policies and schemes may also successfully engage the trained manpower.[57-64] Sensitizing policy makers would be another important step toward highlighting the importance of HTA as an autonomous domain.[14,18,44] As per the evidence from the available literature, teaching and training programmes architect the future research and policy formulation.[26-30] HTA implications would be better understood by the people at the decision making level in a series of health policies.

Accordingly, comprehensive efforts are required at each stage for teaching and training of HTA at the wider-scale to cater the suitable healthcare needs/demands. Resultant improvement in decision making and health care technologies would pave a way to achieve enhanced awareness, improved access, and desired affordability along with the better human and institutional capabilities to endure progressive health technology advances.[49,65-67]

The future prospects of HTA curriculum in India

Being burdened with increasing cost of health-care services, higher share of OOPE and impoverishment, the HTA curriculum holds a promising future in Indian health-care system.[68] It could provide a platform for the prospective policy formulators to be engaged in strategic decision making by maintaining equilibrium between demand and supply of healthcare services, evidence-based prioritization of assessment and implementation of innovative schemes.

This curriculum may guide in initiating a bridge between the prospective health care providers and appropriate population in need of certain interventions. Being a key initiator of HTA, the government can minimise wastage of the financial resources and opportunity cost, and would be also benefited in terms of better affordability, improved provisioning of health service, and avoiding inappropriate practices.

Smooth functioning of the proposed curriculum and translating cost-effective service provision into practice may be confronted with complex and fragmented educational/academic design in India.[35,36] Other major challenges associated with the effective implementation of the curriculum in India are inclination of the educational system, availability of essential data/evidence, cost for implementation, infrastructure/manpower, and monitoring/evaluation. Further, health being a state subject drives the decision-making and also creates intricacies between the central and state government which may affect the implementation of HTA. Present study stresses on the expected outcomes from the proposed curriculum which may increase the credibility, accountability, quality of the trained manpower, utilization, and quality of care especially for the disadvantaged segment of the population.

Conclusion

As per the initiatives of DHR, the HTA research activities are carried out in India through HTAIn hubs which have been initially setup in six regions of the country. This review highlights noticeable gaps in existing curriculum in India and necessitates a novel academic initiative by introducing HTA in a full-fledged manner. There is dearth of any formal educational endeavors, teaching, and training courses offered in regular manner in any of the educational institutions in India. Due to lack of integrated course/module availability, an urgent need is felt to formalize a standardized course that can cover all domains of HTA and is deliverable to the proposed audience in most convenient manner. To strengthen the future HTA activities, lessons can be drawn from success stories of Asia-Pacific regions such as Australia, Singapore, Malaysia, New Zealand, and others. This should be further strengthened with strong academic collaborations to generate findings, challenges, and solutions. It would also strengthen the available manpower, ensure a healthy community, environment, and sustainable and affordable health technologies to achieve UHC. We propose to introduce teaching/training modules on HTA in full-fledged classroom-based learning along with distance and virtual methods. Being in the initial stage, we recommend introducing this curriculum in the government/public organisations, including research, academic, and autonomous public institutions. At the later stages, the other stakeholders such as private sector, NGOs, and civil society organizations can be also involved.

Limitations of the study

Being an evidence-based review; it is confined to the survey participants, so the generalizability may vary from curriculum to curriculum. Being a noble initiative, evidence are limited for educational initiatives on HTA in Indian context.

Author's contribution

RD, RA, and SP designed the study. RD with the help of RA wrote the paper. RA with the help of RD analyzed the data. RD, RA, SP, KCS, and DB finalized the article. All authors read and approved the final manuscript.

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Conflicts of interest

There are no conflicts of interest.

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