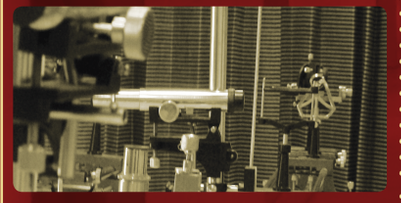
NATIONAL INITIATIVE FOR ALLIED HEALTH SCIENCES

A STUDY TO AUGMENT THE CAPACITY AND QUALITY OF ALLIED HEALTH PROFESSIONALS IN INDIA

From 'Paramedics' to Allied Health Professionals:

Landscaping the Journey and Way Forward



A report commissioned by the
MINISTRY OF HEALTH AND FAMILY WELFARE
Government of India

KNOWLEDGE TO ACTION
phfi
PUBLIC HEALTH FOUNDATION OF INDIA

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गुलाम नबी आज़ाद
GHULAM NABI AZAD

सत्यमेव जयते

स्वास्थ्य एवं परिवार कल्याण मंत्री
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निर्माण भवन, नई दिल्ली-110108
Minister of Health & Family Welfare
Government of India
Nirman Bhavan, New Delhi-110108

MESSAGE

India's health care delivery system is unique in its challenges and strengths. Though it has seen consistent improvement in recent years, it also faces multiple human resource shortages at all levels.

2. The issues relating to quality, training, consistency and availability of required number of skilled health care personnel to meet the demands of health care needs of 1.2 billion people are being continually addressed and there remains an immense potential for absorption of adequately trained health care workforce.

3. I am glad that Public Health Foundation of India (PHFI) has carried out a detailed study to identify and quantify the allied health professionals in the Country.

4. By integrating these allied health professionals into the Indian Healthcare System, it will be possible for us to bridge the gap between the demand and supply of human resources for better health care delivery.

5. The Ministry of Health and Family Welfare has already taken steps to establish one national and eight regional institutes of para-medical sciences to serve as centres of excellence for allied health education across the country.

6. These institutes will help in further standardisation of various allied health care courses and help in augmenting the number of skilled professionals throughout the country besides bringing in uniformity in capacities and skills according to latest developments in the respective fields.

7. The recommendations and roadmap made by PHFI, when implemented, would be a major milestone towards strengthening health care systems in the Country.

(Ghulam Nabi Azad)

New Delhi
28.8.2012

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सत्यमेव जयते

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MINISTRY OF HEALTH & FAMILY WELFARE
NIRMAN BHAVAN, NEW DELHI - 110108

14th August, 2012

PREFACE

The report "From Paramedics to Allied Health Services: A study of the Allied Health Ecosystem and a roadmap for human resource capacity augmentation" has been developed by the Public Health Foundation of India, after consultations with all relevant stakeholders and over 300 national and international experts. This process is the first of its kind undertaken in India, to identify and quantify the Allied health Professionals (Commonly known as 'paramedics') in a comprehensive fashion and acknowledge their contribution in changing the health human resource paradigm.

The report highlights the importance of standardizing the existing plethora of courses and curriculum, organizing the diverse management and regulatory protocols and developing new training programmes and professionals as would be necessary. It also provides a logical roadmap for implementation, by recognizing and leveraging existing program strength national institutions of excellence through meaningful partnerships in both the public and private sector.

I thank all the State/UT Medical Colleges in providing the necessary data to arrive at an estimate of the demand-supply situation, as well as all the experts for painstaking efforts in arriving at the recommendations. I also appreciate the efforts put in by PHFI for providing the overall technical leadership and coordinating this initiative.

I am certain that this report will be a useful source of knowledge and action to all those dealing with health human resource issues within the system, particularly those in the field of Medical and Paramedical education.

(P.K. Pradhan)

Terms of Reference (ToRs)

i. Desk review of the paramedical training landscape, including situational analysis, methodology of teaching, inputs and regulatory framework for the paramedical disciplines;

ii. Content development, including training of trainer (ToT) protocols, facilitation guides for faculty, and resource references and instructional kits for the NIAHS;

iii. Overall recommendations, including a framework to augment the availability of paramedical personnel, methodology of teaching, inputs, protocols for certification, regulatory framework and national standards, as well as benchmarking for accreditation;

iv. Recommendations for the National Institute of Paramedical Sciences (NIPS) and the Regional Institute of Paramedical Sciences (RIPS), including vision and mission statements, model for operations, implementation plan, relationship matrix outlining the roles of stakeholders, HR positioning, management arrangements, financial protocols and budget, protocols for a pedagogical renewal process, scope of alternate models of learning, framework for long-term sustainability, creation and updating of training content and modules, conducting regular in-service training and training on cutting-edge technologies.

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INTRODUCTION

In March 2011, the Ministry of Health and Family Welfare nominated the Public Health Foundation of India (PHFI) as its technical partner and constituted the National Initiative for Allied Health Sciences (NIAHS) secretariat with a mandate to develop a framework to improve allied health training, education and regulation in the country.

Fundamental to the national initiative- undertaken by the health ministry- is the vision to bring uniformity to teaching methodology, clarify protocols of certification and set national standards for regulation of allied health sciences and professionals. The initiative comes at a time when the Government of India- under the 12th five year plan- has set itself the target of providing affordable and accessible healthcare to all citizens. India's mandate for universal health coverage, to a great extent, depends on the availability of qualified and adequate allied health professionals at primary, secondary and tertiary levels in both private and public sector. Addressing shortages in human resources is the first step towards expanding the reach of health services in underserved areas.

The terms of reference set by the health ministry directed the NIAHS secretariat to map the allied health training landscape and the current regulatory framework for various allied health disciplines. Over a period of 10 months the NIAHS secretariat conducted extensive desk review, primary and secondary research to compile a detailed situational analysis of the existing allied health space in India.

Central to the recommendations developed for reconfiguring and restructuring the allied health space, is setting up of dedicated national and regional institutes with the objective of nurturing talent, retaining allied health professionals and strengthening the health systems to align it with the overarching goal of providing universal health coverage to Indians. Research by the NIAHS secretariat has indicated vast inter and intra state differences with public and private facilities struggling to cope with increasing human resources costs, shortages, uneven distribution and skill-mix imbalances.

India has traditionally leaned towards a 'doctor-centered' healthcare delivery, with little attention paid to specialization in allied health sciences. Investing in allied health professionals has, at no point in history, been so crucial to reforms in public health sector. Corrections to bridge demand and supply gaps – ensuring sustained availability of allied health professionals for future generations — remains a cornerstone in India's plans for healthcare reforms.

Population based human resource norms, for India's health services, set as early as 1946 by the Bhore Committee, are yet to be achieved. The Bhore Committee had recommended one

nurse per 500 persons; one pharmacist per 2000 persons, one laboratory technicians per 30,000 persons; one health inspector per 20,000 persons (Chaddha committee); one male and female health worker for 3000-3500 persons at primary level of care.

As India struggles with heavy disease burdens, with the emerging challenge of non-communicable diseases superimposed on the urgency of achieving millennium development goals, deficiencies in human resources- in terms of both skills and numbers- will be formidable barriers to India's health care sector reforms. It is of pivotal importance that these are overcome through initiatives that address both the scale and quality of our health workforce.

The NIAHS secretariat has studied global best practices, especially models followed by other low and middle income countries, while developing strategies relevant to the Indian context. To put together this report, a dedicated project secretariat was established at the Health Systems Support Unit of PHFI, which consulted over 300 experts while the project was in progress. The NIAHS secretariat also gained immensely from their consultations with experts in the health ministry.

This report is a pioneering initiative by the health ministry which aims to address the challenges faced by allied health professionals, for the first time, as a national priority. We hope this report will encourage public discourse and propel academicians, civil society and policy makers to collaborate in designing and implementing targeted interventions for the much required corrections in all aspects of the allied health professional space.

The NIAHS report provides an overarching framework to realign India's human resources in accordance with the growing demands of the health sector. This report is only the first step in a journey that will require concerted efforts from all stake holders to turn the aspirational goal of universal health coverage into a reality for India.

Prof. K Srinath Reddy
President, Public Health Foundation of India

Executive Summary

Redefining India's health service delivery paradigm: from 'Paramedics' to 'Allied Health Professionals'

In the past decade, a fundamental shift has occurred in healthcare delivery, largely due to advances in science and technology. There is now more recognition, than at any time in the past, that health service delivery is no longer just a prerogative of physicians and nurses. It is now a team effort, drawing upon the expertise of both clinicians and non-clinicians. These professionals or health-service providers have been historically identified as 'paramedical staff' or paraprofessionals or health technicians.

Better appreciation and utilization of the whole range of skills possessed by these paraprofessionals-collectively termed as Allied Health Professionals (AHPs)—is the key to health-sector reforms in India, especially given the shortage of doctors and nurses in semi-urban and rural areas of the country.

As the Indian government sets about reforming the public health sector and making universal health coverage a reality in India, the availability of qualified human resources for health has emerged as a significant challenge facing the healthcare delivery mechanism. There is an urgent need for the Indian government to plug policy gaps and ensure generation of adequate and effective human resources for health to provide quality care at primary, secondary and tertiary levels of health delivery in the country. There is a huge dearth of trained technologists/technicians in the system; advancement in technology in recent times demands trained individuals who can provide reliable results in conjunction with patient safety.

Globally, the incidence of non-communicable diseases (NCD) is steadily increasing and in India, the heavy disease burden and the lack of access to healthcare will see the public health system face an NCD epidemic in the coming years. Public health facilities in India are unprepared as there are not enough specialists – clinicians and non-clinicians – to serve the entire country. The government is planning huge allocations for NCDs and for upgrading primary health centres with a focus on training personnel at this level to deal with future epidemics such as NCDs. Technicians, technologists and therapists will thus be required in huge numbers in the coming years.

A major problem is an overall human resource shortage, which leaves gaps within the existing infrastructure and services, both within and outside the public sector. The types of human resource crunch faced across the country vary due to factors like acute shortages, imbalances arising out of geographical distribution and low productivity amongst hired staff. Acute shortage is commonly aggravated by a skewed distribution within the country and movement of health workers from rural to urban areas, from public to private (for-profit and not-for-profit), or to jobs outside the health sector. Contributing factors include insufficient investment in pre-service training, migration, work overload, inadequate growth opportunities and work environment issues (infrastructure, technical and safety, amongst others).

India, currently, has the world's greatest burden of maternal, newborn and child deaths. In 2008 alone, India lost 68,000 mothers and 1.8 million children under the age of five to maternal and child morbidity[3] Thus, in addition to the tribal population, mothers, infants and children constitute the majority of the

underserved. There are other vulnerable populations in India as well, such as the elderly and the disabled who do not have ready access to healthcare services.

According to the most recent figures reported in the World Health Statistics 2011, the density of doctors in India is 6 for a population of 10,000, while that of nurses and midwives is 13 per 10,000 population. India has a doctor to population ratio of 0.5:1000 in comparison to 0.3 in Thailand, 0.4 in Sri Lanka, 1.6 in China, 5.4 in the UK, and 5.5 in the United States of America. A recent study undertaken by the Public Health Foundation of India (PHFI) for the Ministry of Health and Family Welfare (MoHFW) has indicated a supply-demand gap of about 65 lakh allied health professionals, when demand was calculated using basic international norms.

These Human Resources for Health (HRH) shortfalls have resulted in the uneven distribution of all cadres of health workers, medical and nursing colleges, nursing and ANM (Auxiliary Nurse and Midwife) schools, and allied health institutions across the states with wide disparity in the quality of education. The uneven distribution of professional colleges and schools has led to a severe health system imbalance across the states, both in the production capacity and in the quality of education and training, leading to poor health outcomes.

The public health system in India suffers from weak stewardship and oversight, HR shortages, weak HR management and ineffective service delivery. Doctors, nurses and allied health providers are in short supply for the populations they serve. The ratio is often skewed, resulting in fewer health providers in rural areas (especially in primary health centre settings), inefficient secondary services in smaller towns and a high concentration of tertiary health care services in urban cities. The skill mix, autonomy and funding of the medical bureaucracy at the district level need to be augmented, and initiatives for health need to be coordinated with efforts to address social determinants of health.

Many committees and experts have highlighted the importance of paramedics (allied health) in healthcare delivery in the past, including the National Knowledge Commission, which placed more importance in producing more AHPs over doctors, despite the acknowledged scarcity of the latter:

"the opinion of 72 experts in the country over 40 years' there is no need to increase the number of doctors but instead improve the quality and orientation of service provision towards better meeting the health needs of the people' and that, 'there is a dire need to focus on increasing the quantum and quality of human resources for nursing and paramedical/allied health services."

Globally, there is mounting evidence that healthcare as a composite whole can only be improved if human resources for nursing and allied health services are developed, nurtured and enhanced in a systematic and planned manner. In India, there is a significant lack of standardization across medical education in general and in teaching advances in skills and technologies that emerged in the past decade, in particular.

In the case of AHPs, since the nomenclature for different categories of health professionals varies in different countries, there is a considerable lack of clarity as to what constitutes a paramedical, paraprofessional or allied health service. For example, the term used for a person engaged in diagnosis and consultation regarding management and intervention of speech disorders differs in different countries. Australia uses the term 'speech pathologist' whereas the United States calls him or her a 'speech language pathologist' and in the United Kingdom, he or she is known simply as a 'speech and language therapist'.

AHPs are woven into the fabric of public health in India. They are in the vanguard of creating a service based on people 'being healthy' rather than a service based on 'fixing ill-health'. There is ample international evidence suggesting that empowered AHPs can be the leaders of change, playing critical role in improving the reach of health services in underserved areas.

With a vast variety of allied health professions already present and with newer categories coming on board each day, India too, faces a similar challenge as

different states have been using different definitions to describe this ever-growing field.

The breadth and scope of the allied health practice encompasses the following:

- The age span of human development from neonate to old age;
- Working with individuals with complex and challenging problems resulting from multi-system illnesses;
- Working towards health promotion and injury prevention, and the assessment, management and evaluation of interventions;
- Working in a broad range of settings from a patient's home to acute, primary and critical care settings; and
- Having an understanding of the healthcare issues associated with diverse cultures within society.

The importance of these professionals has been explained with an example by K.S. Reddy, Dean of the Jawaharlal Institute of Post-Graduate Medical Education and Research (JIPMER), Puducherry. He noted that, 'during the process of cardiac surgery, the functions of the heart are taken over by a machine. The person who handles this machine literally holds the life of the person. Any mistake can be life-threatening. This is why we now insist on trained staff to handle such machines.'

With advancements in technology over the past few decades, the quality of medical care has vastly improved across the world. This has thrown up fresh challenges for the medical field. Today, there is an urgent need for competent people who can handle highly sophisticated medical machinery with competence. In fact, diagnosis has become so dependent on technology that the role of allied health staff has become vital in delivering successful treatment.

There appears to be an increasing "health–illness–medicine" complex in the society wherein people seek medical solutions to various problems which are not medical in nature and consider them as illnesses. Functions that were once the domain of parents, clergy, teachers, judges and social workers are now seen as medical functions.

As American physician and educator, Leon Kass, points out, "…all kinds of problems now roll to the doctor's door, from sagging anatomies to suicides, from unwanted childlessness to unwanted pregnancy, from marital difficulties to learning difficulties, from genetic counselling to drug addiction, from laziness to crime...'.

Several factors have contributed to the uneven power balance between doctors and AHPs. Medical dominance coupled with what is called "Medicalisation" is considered to be a major reason.

Medicalisation, has not only broadened the scope of medicine but also raised its status. It reinforces the image of medical practitioners as being omniscient and omnipotent and impels societies to allocate continually growing proportions of gross domestic product to their preferred healthcare services.

Closely linked with medicalisation is medical dominance; they reinforce each other. According to American academician and sociologist, Professor Eliot Freidson, medical dominance has at least three components:

- Trust, faith and confidence by the public in the medical profession;
- A position of authority based on exclusive command over a body of specialised knowledge; and
- Dominance in the division of labour, that is, control over other health professions.

To these may be added the privilege of self-regulation, whereby the profession regulates the behaviour of its members and monopolises decision-making and the use of resources.

Medical dominance of healthcare has traditionally been the organising principle in the healthcare delivery system. Medical power is manifested through the professional autonomy of doctors, their pivotal role in the economics of the health services, their dominance over allied health occupational groups, administrative influence and the collective influence of medical associations. The clear hierarchy of occupations

established through the growth of hospital medicine is attributed as a major contributor to the dominance of medicine in the division of labour.

Thus, high medical domination has been instrumental in lowering the status of AHPs in the eyes of people and is one of the reasons for the low morale and self-esteem among AHPs which needs to be addressed immediately if they were to contribute meaningfully to the well-being of people.

In many countries, notably the United States, the United Kingdom, Canada and Australia, policy rationalisations by their governments have facilitated the release of AHPs from medical dominance. The Pew Health Professions Commission report (1995), titled *'Critical Challenges: Revitalizing the Health Professions for the Twenty-first Century'* observed: 'the needs of the integrated systems will not be met simply by hiring [new] public health professionals [but by] substantial and ongoing retraining of nurses, physicians, allied health personnel, and managers . . . [who are] required to apply the skills in new contexts.' The report calls for creative and risk-accepting leadership in providing training and education, a 'renaissance' in educating public health professionals. Training and retraining for public health should be based on competencies, that is, the focus should be on what people should be able to do, rather than what they should know.

Professor Donald M. Berwick, President and Chief Executive Officer, Institute for Health Care Improvement, and Clinical Professor of Paediatrics and Health Care Policy, Harvard Medical School in the Foreword of the book Managing and Leading in the Allied Health Professions, makes a strong case for de-medicalisation and eliminating medical dominance when he raises and answers several pertinent questions as follows.

- 'Allied to what?': '...the continual pursuit to relieve suffering for those we serve.'
- 'In what way "professional"?': 'In the willingness to subordinate self-interest and prior assumptions to the pursuit of continual improvement in our effectiveness as a team, and to redraw the boundaries in the status quo.'
- 'Why "health" and not "healthcare"?': 'To broaden the base of our capacity to serve.'
- 'Are physicians, too, "allied health professionals"?': 'Of course. Why would you even bother to ask? We are all on the same team.'

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of medical and health personnel, and their capacity to function as an integrated team. For instance in the UK, more than 84,000 AHPs, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. Though some of them may have a PhD and use the title 'Dr' (for example, psychologists), they are not medically qualified. All of them are first-contact practitioners and work across a wide range of locations and sectors within acute, primary and community care. Australia's health system is managed not just by their doctors and nurses, but also by the 90,000 university-trained, autonomous AHPs vital to the system.

The recent modernisation of healthcare has initiated a team-based healthcare delivery model (Baker, et. al., 2006; Wagner, 2004). Medical teams are usually 'action teams' due to their dynamic work conditions, wherein teamwork and collaboration are the pre-requisites for optimum results. The process of teamwork is inherently interdisciplinary, requiring a division of labour among the medical, nursing and allied health fraternity. Poor teamwork skills have been found to contribute to negative patient-care incidents.

Not only is this team approach important for safe patient outcomes, it is also critical for efficient, cost-effective operations. Let's take a case in point at the William Harvey Hospital, East Kent Hospitals of the NHS Trust, where an accident and emergency assessment team is made up of an occupational therapist, a physiotherapist and a care manager. The team provides a full functional and social care assessment for frail elderly patients who arrive at the Accident and Emergency department in Ashford. The team's immediate care package often allows patients

to return home immediately to more appropriate care, with the support of an occupational therapist. The impact of the team's work has been to free up 12 extra acute beds – the equivalent of 4,500 acute bed-days per year. The service is also far quicker; the team can often see patients within two hours, whereas earlier it often took more than two days.

'The team believes that patients have benefited because the decision-making is better and faster. We can now see the whole picture; our care is much more holistic. As a team we have the most appropriate skills to make the best decisions on whether a patient can go home safely or should be admitted to hospital.'

Currently, due to the absence of a central regulatory authority for allied health professionals and courses in India, they are divided into smaller groups, appearing to be 'regulated' by independent professional bodies at national and state levels. For instance, the rules or norms of professional practice vary from extremely professional and well-organised groups such as physiotherapists, optometrists and speech and audiology professionals to diffused groups such as operating room technicians and radiation therapists.

For the allied health cadre to grow in the healthcare system, these professional associations need to be bound by a common authority that will help the AHPs to flourish as a family rather than different classes within the community of the healthcare system. The role of regulating both the profession and professionals cannot be an optional path but rather a condition for participation in the profession.

It is therefore necessary to regulate these professions by setting up councils on the lines of the councils for pharmacy, nursing and other professions.

In 2007, the government of India proposed setting up separate councils for medical laboratory technicians, radiology technicians, and physiotherapists/ occupational therapists. These councils would be responsible, inter alia, for the maintenance of uniform standards of education in the respective disciplines and the registration of qualified personnel to practice the profession.

A representative of the MoHFW apprised the Parliamentary Standing Committee on Health and Family Welfare about the circumstances that necessitated the firming up of a Bill to set up the new council. He pointed out the following problem areas, which require regulation at the earliest:

- Para-medical professions are not regulated;
- Entry-level qualifications are different at different levels;
- Level of knowledge and skills is not uniform, since the period of training differs from place to place and has no uniformity;
- Course curricula are not uniform;
- Fee structure and facilities in these institutions are not regulated; and
- Ethical standards are not uniform and are not being enforced.

The lack of planned courses and institutions, non-uniform nomenclature for the existing courses, diverse standards of practice and lack of qualified faculty pose a threat to the quality of education and skills of the AHP in India. Although there are professional associations for certain AHPs, for example, the Indian Optometric Association and the Indian Occupational Therapy Association, the fruitful engagement of these associations remains to be explored. Lack of definitive and uniform criteria for faculty regarding essential qualifications for their classification, nomenclature, entry (direct versus lateral) and the absence of faculty development programmes perpetuate the challenges pertaining to the quantity and quality of AHPs.

The availability of educational resources such as libraries, simulation centres and modern information technology tools at various centres is also variable. While established centres managed by large medical institutions offer a reasonable level of facilities, the educational resources are abysmal in stand-alone centres or smaller set-ups.

The Confederation of Indian Industry (CII) believes that 'private partners can play a key role in capacity building and training through PPP modes to better utilise the infrastructure of government hospitals.

The government can encourage private sector interest through initiatives such as provision of tax incentives, and permits to corporates to undertake healthcare for optimised use of resources. For example, a medical college with a 500-bed capacity could produce 150 students annually, instead of the 100 as per the current MCI norms.' A CII policy paper points out that 'capacity building and training initiatives by the government need sharpened focus not only for a quantitative increase in trained manpower but also for improving the effectiveness of existing methods in training'.

Extensive research by the PHFI team during the course of 12 months indicates the need for an overarching regulatory body for AHPs, excluding doctors, nurses, dentists and pharmacists. The PHFI team has recommended the establishment of national and regional institutes for allied health sciences, dedicated to nurturing and retaining talent in the allied health space. In the absence of a Council, this could be an interim multi-stakeholder body comprised of experts from different allied health professions, administrative leadership and even patients. This body would be responsible for ensuring standardisation of education and putting in place quality control mechanisms for educational institutions, teaching methods, clinical protocols, workforce management and any other related issues.

Standards and acceptable terminologies for the various professionals encompassing allied health starting must be established; with the group being referred to as Allied Health Professionals or AHPs in lieu of 'paramedics'. A definition put forth by the PHFI team is thus: "Allied health professionals include individuals involved with the delivery of health or related services, with expertise in therapeutic, diagnostic, curative, preventive and rehabilitative interventions. They work in interdisciplinary health teams including physicians, nurses and public health officials to promote, protect, treat and/or manage a person's physical, mental, social, emotional and environmental health and holistic well-being"

In addition, it is critical to undertake a complete reorganisation of the various categories of AHPs based on educational levels and specialty qualifications to match international nomenclature and highlight their importance as vital team players in the healthcare delivery system. Standardised nomenclature is also recommended for AHPs as part of their career progression, so that promotional levels and associated pay grades may be normalised accordingly.

Courses should follow international standards so that they are widely accepted and receive worldwide recognition. Students passing out from colleges should be in great demand and get good jobs. The educational methods should lead to a product that is worthy of recruitment; therefore, it is very important to keep abreast of knowledge and maintain good liaison with the industry. Course delivery, practical training and assessments should be standardised. Committees should be formed to look into all aspects and standardisation. Standardisation should incorporate the demonstration of learning as well.

Each institution conducting courses on allied health should analyse and keep a record of the student base. This should consist of key statistics and qualitative information such as demographics and the type of applicants for each course, the number that are selected, enrolled and those that ultimately graduate, and the number of drop-outs each year by specialty. This will help generate a better picture of the supply demand issues for the future. Strategies should be developed to create flexibility in course delivery through alternative delivery modes, multiple locations and timings. There is also a need to look at options for fast education especially for persons with experience but without adequate qualifications. Additionally, short term educational programmes need to be put in place for those who have a basic education such as a B.Sc. degree in any science subject and want to pursue a career in allied health sciences.

For each course, centres of excellence and globally recognised institutions should be identified along with hospitals with known good practices, which may become possible training sites. Those institutions willing to conduct courses or to become training sites should be incentivised by the government. It is

important to motivate both government and private institutions to conduct courses at various levels (diploma to post-graduate and doctoral) depending on their capacities, thus increasing the number of courses in various streams and the students for each course. However, if this is not possible, then they should be motivated to at least become clinical training sites rendering quality education to students.

All bottlenecks that may be related to regulatory or financial issues that prevent institutions and hospitals from serving as clinical sites for training should be identified and efforts should be made to minimise them. Solutions should be found for interactions between educationists and potential employers to assess the availability of clinical sites.

Quality improvement can be implemented by establishing partnerships with international institutions of excellence and PPPs to bring out the best in the profession. The standards developed at the centre and state levels should be in complete harmony with each other. Emphasis on research activities needs to be enhanced and the funding provided at regular intervals either by the centre, state or foreign direct investment, etc., which can be used for the development of the research centres.

Along with the applicability of the desired means to augment capacity, it is also essential to focus on quality education. The Government will need to develop a number of options to encourage flexibility in the allied health sciences' education without compromising on its quality. Improvement in infrastructure and availability of faculty is a challenge that needs to be addressed, and the Government should provide relevant support.

There is a need to define a pathway of an upgraded lateral entry within the allied health educational universe, such as for a diploma holder to enter a degree programme. All avenues for each level of transition should be defined. With respect to public awareness, candidates should be well-versed with the difference in opting for any degree or diploma programme.

Robust Public Private Partnership (PPP) models need to be established for the training of faculty and ensuring that the required numbers of students graduate each year. Some incentive or financial support should be provided to start these courses. Strengthening community colleges in terms of proper committees and faculty, and following standards is essential. It is also necessary that recognition by the Union Ministry of Human Resources Development and the Directorate of Employment as well as training by the respective State governments be carried out so that the students from these colleges get national and regional acceptance.

The Path Forward

The national initiative for allied health sciences aims to go beyond prescribing basic project development and management norms. It hopes to convert academic arguments for strengthening allied health sciences into politically articulate policies that help in capacity building and value realization of allied health professionals in the healthcare delivery system.

Nine premier institutions (eight RIAHS and one NIAHS) will be the lead technical resources for education and training of students. Moreover, to provide education on such a scale assumed extensive collaboration between various stakeholders at the Centre, state and intra-state levels. The initiative may be introduced in a phased manner. Activities will include setting up National and Regional Institutes of Allied Health Sciences (NIAHS and RIAHS), establishing interim regulatory mechanisms in order to standardize curricula, training programmes and develop faculty across India in the allied health streams, while engaging a network of institutions, as indicated in Chapter 3. Thus, the implementation arrangements would also require the establishment of management structures at the national, state and institutional levels.

There is also a need to form a task force for curriculum development cells in existing universities, which will be affiliated with project institutions and spread best practices to non-project institutions. There is a need to establish industry–institute partnership promotion cells, along with sharing of best academic,

administrative and governance practices through workshops and specific groups.

The NBAHS will be responsible for overall monitoring of allied health education and practice in the country, and its coordination with other Ministries/ Departments and the All India Council for Technical Education (AICTE). The Board will be supported by two committees under it; the National Allied Health Education Committee (NAHEC) and National Allied Health Evaluation and Assessment Committee (NAHEAC) to ensure that standard and acceptable terminologies are used for the various professionals in allied health.

To conclude, Allied Health Professionals (AHPs) constitute a vital part of the health system delivery, both nationally and internationally. In the Indian context, however, their significance and role has been marginalised due to the prevalent culture of medical dominance and the lack of a statutory body to give prominence to their contributions and concerns.

Allied health workers are an untapped treasure, critical to fixing the gaping holes in India's health workforce, particularly the severe shortage of physicians and specialists. It would be a grave mistake to not utilise the capacities of this resource at a time when the government is bringing in critical reforms in public health and aiming to improve access to health by focussing on preventive, promotive, curative and rehabilitative needs of the population.

While the government is considering strategies to best utilize AHPs, the private sector has realised their potential and established several institutions and mechanisms to integrate these professions and professionals into the organised healthcare sector. However, the growing demand has resulted in the mushrooming of big and small institutions claiming to provide allied health education.

As the Ministry of Health and Family Welfare in India gets ready to undertake a facelift for the entire allied health workforce by establishing national and regional institutes of excellence, the time is opportune for the government to study this provider group in detail; review existing inputs, processes and outputs; standardise institutions, educational tools and methods; revisit career paths and progression; and re-introduce these professionals into the public system to reap much-awaited rewards in the form of improved health outcomes for the population.

Chapter 1

The Allied Health Ecosystem

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The Allied Health Ecosystem

1. Introduction

Health is defined by the World Health Organization (WHO) as a state of complete well-being, i.e. physical, mental and social well-being, and not merely the absence of disease. By that definition, all 'people engaged in the promotion, protection or improvement of the health of the population are "health workers"'[1]

In the past decade, a fundamental shift has occurred in healthcare delivery, largely due to advances in science and technology. There is more recognition than at any time in the past that health service delivery is no longer just a prerogative of physicians and nurses. It is now a team effort, drawing upon the expertise of both clinicians and non-clinicians. These professionals or health-service providers have been historically identified as paramedical staff or paraprofessionals or health technicians.

Many committees and experts have highlighted the importance of paramedics in healthcare delivery in the past, including the National Knowledge Commission, which placed more importance on producing more paramedical professionals than doctors, despite the acknowledged scarcity of the latter. Based on the opinion of 72 experts in the country over the last 40 years, the paper on production and utilization of health manpower towards improvement of health services in India states that

> *'there is no need to increase the number of doctors but instead improve the quality and orientation of service provision towards better meeting the health needs of the people' and that, 'there is a dire need to focus on increasing the quantum and quality of human resources for nursing and paramedical/allied health services.'*[2]

At present, the shortage of quality human resources is one of the major challenges faced by the public health domain in India. To redress the imbalance in human resources, the Working Group on Medical Education Training and Manpower Training of the Planning Commission (1984) prioritised training of paraprofessional and auxiliary personnel as follows:[3]

- Training and development of auxiliary personnel
- Training and development of paraprofessional personnel
- Basic and pre-service/induction training in public health and health management;
- Continuing education in health management and public health
- Undergraduate medical education; and
- Postgraduate medical education

Acknowledging the shortage of clinicians, the Mudaliar Committee,[4] in 1962, underscored the need for redesigning health service delivery with better roles for auxiliary and paramedical personnel, leading to better utilization of doctors and nurses. Fifty years later, the recommendation still remains pertinent to reforms in the Indian public health sector as paramedics can reduce costs and augment the quality of care. Better appreciation and utilization of the whole range of skills possessed by these paraprofessionals–collectively termed allied health professionals (AHP)—is the key to healthsector reforms in India, especially given the shortage of doctors and nurses in the country.

Many new health occupations (physicians' assistants, nurse practitioners, certified nurses) have

emerged over the past several decades to assume some of the work that doctors used to perform. Not only is the work deskilled, but it is also increasingly conducted without the doctor/physician's control and supervision as other professional workers seek their own identity and autonomy. These processes have received support from administrators who are constantly searching for cheaper labour, apart from the controlled trials revealing that AHPs can, in many circumstances, do the same work just as effectively and efficiently for those patients who must use them. Preference for the term 'allied health professional' rather than 'physician extender' or 'physician assistant' reflects the promotion of this occupational division of labour.

Service users are becoming more empowered through the consumerism of health, which has resulted in better access to information and user-consultation in service development and delivery. Each of these factors has the potential to influence the roles of existing professional groups and presents a challenge to workforce planners.

In India, students are not aware of all the allied health courses available in the medical education system. Their career choices are generally influenced by their parents and peer groups, who themselves are unaware of the prospects in this area. By understanding that an entry-level position is just a first step, youth can realistically plan for their future and have a better understanding of what is needed for long-term success. This approach also benefits employers who need a steady inflow of workers at all levels of their organisation.

2. Who is an allied health professional?

AHPs work in all areas of public health and social care. They often provide the cross-boundary integration needed to deliver seamless services to patients and their caregivers, thus creating a model of social solidarity. In some areas, AHPs offer open access to their services, thus providing rapid responses to patient needs in therapeutic fields where getting the services of a general physician (GP) or consultant invariably takes longer.

AHP-led services significantly reduce the cost of similar services structured around a consultant physician model.[5] They play a supportive role in providing personalised care in dealing with children with communication difficulties, young offenders, the elderly, cancer patients and those with long-term conditions such as diabetes. AHPs also have an important role to play in the treatment of those with disability, such as those with vision problems, amputees and others.

For some patients, such as stroke survivors, it is the support of AHPs that greatly enhances their rehabilitation and return to normal life in the longterm; AHPs also play a significant part in the care and return to well-being of patients who struggle with mental and emotional challenges.

The above description of AHP functions is an incomplete listing of the many categories of patients and potential beneficiaries who are helped by the personalised attention given by AHPs. The role of the AHP has grown in knowledge and competence with the evolution and specialisation of medical care.

3. Classification of AHPs

AHPs are typically divided into two categories: technicians (assistants) and therapists/technologists.

Technicians are trained to perform procedures and their education lasts for less than two years. They work under the supervision of technologists or therapists and include physical therapy assistants, medical laboratory technicians, radiological technicians, occupational therapy assistants, recreation therapy assistants and respiratory therapy technicians.

Therapists or technologists, on the other hand, acquire procedural skills and learn to evaluate patients, diagnose conditions, develop appropriate treatment plans by judging potential side-effects, ascertain

therapy responses, and make appropriate decisions about treatment continuation/modification.[6]

The Pennsylvania Workforce Investment Board summarises the main roles performed by AHPs under the headings shown in table below:

Diagnostic	Cardiovascular technologists Medical and clinical laboratory technicians Radiological technologists and technicians
Medical services	Dental assistants Emergency medical technicians and paramedics Medical assistants
Non-direct care	Dental laboratory technicians Medical appliance technicians Pharmacy technicians
Rehabilitative	Occupational therapists Speech–language therapists Respiratory therapists

Dr. Gauripada Dutta, senior member of State Planning Board, Government of West Bengal has offered an alternative classification of AHPs, as given below:

Paraprofessional

These are voluntary workers from the community who are not part of a structural organisation. These voluntary activists receive training and some form of recognition from the community and the local self-government. Community health volunteers/guides and traditional birth attendants were recruited with this idea. Many state governments, for example, Madhya Pradesh and Chhattisgarh, are initiating such schemes in various towns. There is a need for a system to objectively review their efficacy and sustainability while retaining control of the community over them.

Paramedical

They are associated with preventive, promotive and curative health procedures. They include nurses of different categories, social welfare/extension officers, pharmacists, computer workers, and technicians of different categories (e.g. laboratory X-ray technicians, ophthalmic assistants and physiotherapists). In addition, there are multipurpose workers, both male and female, and auxiliary nurse midwives (ANMs).

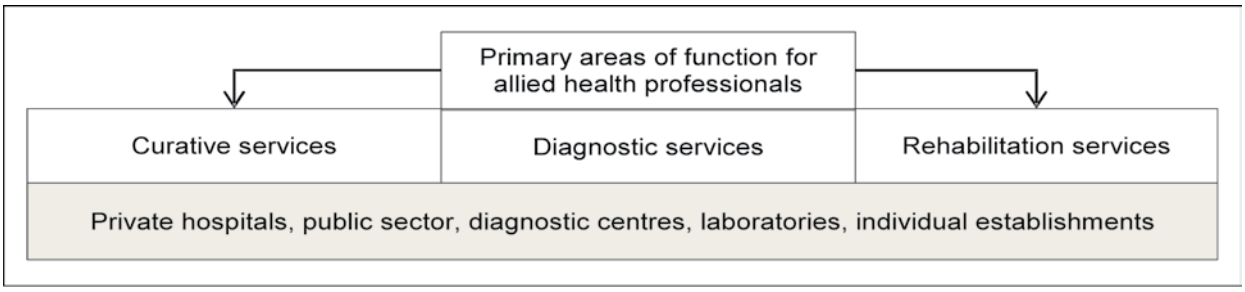
Peri-medical

They are general duty assistants, sweepers and group C workers (clerks, accountants, storekeepers, ward-masters) and non-medical technical hands. They could play an important role in both preventive and curative services.

4. Role of allied health professionals

Allied health professionals play a range of roles from health promotion, health improvement and early intervention to the support of those with long-term conditions, disability and those on palliative care.[7] Mid-level practitioners (MLPs) have rendered care to indigenous populations since colonial times. At present, they assist professionals or render care independently, especially in areas with a scarcity or absence of professionals such as therapists, doctors, dentists, pharmacists and nurses. AHPs provide services both in urban and rural areas, in primary-, secondary- and tertiary-care institutions and in health centres.

Figure 1: Areas of function of allied health professionals



An AHP needs to be skilled in various fields to provide a particular expertise for patient care. With the rise in various non-communicable diseases such as heart disease, stroke, cerebral palsy and developmental disorders, there is a need for specialised care provided by various members of the allied health team such as physiotherapists, occupational therapists, speech–language pathologists, podiatrists, psychologists and dieticians, to name a few. Therefore, the role of an AHP as a part of the multidisciplinary team is open-ended and is projected to increase in the coming years.

The breadth and scope of allied health practice encompasses the following:

- The age span of human development from neonate to old age;
- Working with individuals with complex and challenging problems resulting from multi-system illnesses;
- Working towards health promotion and injury prevention, and the assessment, management and evaluation of interventions;
- Working in a broad range of settings from the patient's home to acute, primary and critical care settings; and
- Having an understanding of the healthcare issues associated with diverse cultures within society.

The importance of these professionals has been explained with an example by Dr K.S. Reddy, Dean of the Jawaharlal Institute of Post-Graduate Medical Education and Research (JIPMER), Puducherry:

> *'During the process of cardiac surgery, the functions of the heart are taken over by a machine. The person who handles this machine literally holds the life of the person. Any mistake can be life-threatening. This is why we now insist on trained staff to handle such machines.'* [8]

With advancements in technology over the past few decades, the quality of medical care has vastly improved across the world. This has thrown up fresh challenges for the medical field. Today, there is an urgent need for competent people who can handle highly sophisticated medical machinery. In fact, diagnosis has become so dependent on technology that the role of allied health staff has become vital in delivering successful treatment.

Training of AHPs is an important issue. However, the Indian healthcare education system has centred on medical, nursing and a few allied programmes. There are hardly any institutes and systems to train other cadres, except those offered through the executing departments or their associated agencies.

Though structured training for AHPs is important, no conscious efforts have been made for positioning and mentoring of AHPs in India and, worse, they are not directly part of the health directorate domain and often do not come under the health system.

5. Placing AHPs in a global context

Internationally, there is mounting evidence that healthcare as a composite whole can only be improved if human resources for nursing and allied health services are developed, nurtured and enhanced in a systematic and planned manner. There is a significant

lack of standardization of the newer skills that emerged in the past decade, as technology advanced.

In the case of AHPs, since nomenclature for different categories of health professionals varies in different countries, there is a considerable lack of clarity as to what constitutes a paramedical, paraprofessional or allied health service provider. For example, the term used for a person engaged in diagnosis and consultation for management and intervention of speech disorders differs in different countries. Australia uses the term 'speech pathologist' whereas the United States calls such a person a 'speech language pathologist' and in the United Kingdom, the term used is simply 'speech and language therapist'.

New technologies and subsequent emergence of newer disciplines in health service delivery have made the categorisation of services provided by AHPs difficult. The absence of a universally accepted definition for 'paramedic' means that it may have been used broadly and mostly synonymously with the term 'allied health professional' (AHP).

'Paramedical professionals' are defined and interpreted differently within and among countries. According to the International Standard Classification of Occupations (ISCO), paramedical practitioners work autonomously or with limited supervision to provide medical services with a more limited scope and complexity than those provided by doctors.[9] Completion of tertiary-level training in theoretical and practical medical services is a pre-requisite for occupations in this category.

This, however, does not include persons dealing with emergency treatment and ambulance practice among paramedics and rather classifies them as 'ambulance workers'. Emergency medical technicians (EMT) who respond to medical emergencies in the field are usually termed paramedics. In the United States, they are classified according to their level of training. However, in France, a central control function – SAMU (Service d'AideMédicaleUrgente', meaning urgent medical aid service), supported by the fire service's first-response vehicles and the SMUR's (Service Mobile d' Urgence et Reanimation, meaning mobile emergency and resuscitation service) Mobile Intensive Care Units (MICU) provide emergency medical services.[10]

To sum up, the term 'paramedical' encompasses a variety of functions with differing requirements for qualifications, skills and providing support services in fields such as dentistry, pharmacy, physiotherapy, ophthalmology and others.

In March 2000, WHO defined AHPs as 'participants who have specific connections with the art and science of healthcare and are recognized as members of the health team in the national health system. They are educated at professional levels in a recognized, accredited health or health-related academic institute.'[11]

BOX 1: Illustrative definitions for allied health professionals

The US Department of Labor Agency for Employment and Training Administration defines AHPs as people who are 'involved with the delivery of health or related services pertaining to the identification, evaluation, and prevention of diseases and disorders; dietary and nutrition services; rehabilitation and health systems management, among others'. According to this definition, AHPs would include dental hygienists, diagnostic medical sonographers, dieticians, medical technologists, occupational therapists, physical therapists, radiographers, respiratory therapists, and speech language pathologists.[12]

The US Department of Health and Human Services defines AHPs as 'experts in a multitude of therapeutic, diagnostic and preventive intervention. These professionals are leaders in the degree and blend of clinical and technical expertise they bring to their specialty areas and represent approximately 50–60 per cent of the healthcare workforce.'[13]

BOX 1: Illustrative definitions for allied health professionals

Though there is no agreement on the composition of allied health services in Australia, the Health Professions Council of Australia (HPCA), in 2002, provided the following definition: 'Allied health professionals are tertiary qualified providers of mainstream healthcare and members of the following professions: audiology, dietetics, occupational therapy, optometry, orthoptics, orthotics and prosthetics, pharmacy, physiotherapy, podiatry, psychology, radiography, social work and speech pathology. Allied health professionals are not medical doctors or nurses.' The professions of chiropractory and optometry seem to fit most definitions of allied health and yet are not usually included in this list.[14]

According to Fitzgerald and Hudson, 'Allied health professionals are tertiary-trained health practitioners (who are not doctors or nurses) from one of several individual professionals who have, for the purpose of presenting a collaborative position, come together to work towards a common goal.' Professions represented in any allied health practitioner group vary depending on the goal of their collaborative effort. Professions may include, but are not limited to, Audiology; Nutrition and Dietetics; Occupational therapy; Orthoptics; Orthotics; Pharmacy; Physiotherapy; Podiatry; Psychology; Radiography; Social Work; Speech Pathology. Hence, a clear definition is still needed.[15]

Since Canada and South Africa do not have legal restrictions on the use of paramedic as a job title, it is legitimately used to refer to all ambulance crew members. They further identify their grades and nomenclature based on the paramedic's training, such as primary, intermediate or advanced.[16]

Many countries provide healthcare through cadres that, though not trained as physicians, perform many diagnostic and clinical functions. These are variously referred to as 'substitute health workers', 'auxiliaries', 'non-physician clinicians', or 'mid-level health providers'. There is no official definition of mid-level providers (MLP) that represents a direct match with any of the professional categories, such as paramedical practitioners, recognised in ISCO. The use of these terms is fairly broad, ranging from internationally recognised groups, including nurses and midwives to whom specific diagnostic and clinical skills have been delegated (nurse practitioners), to cadres developed to meet a specific need in a country – for example, surgical technicians in Mozambique, clinical officers in East African countries. In many African countries, most MLPs have been modelled on professional cadres, such as medical doctors, pharmacists, registered nurses and environmental health officers. Asian countries have, over the years, developed local MLP categories, from birth attendants to health assistants, which are not modelled on traditional health professions, but respond to specific needs.

From the above examples of varying descriptions, it is clear that an AHP is someone who is well qualified to provide care to a patient as part of a multi-disciplinary team. Given the various aspects of patient care which are affected and enhanced by the intervention of an AHP, it is clear that an AHP is an important part of the multidisciplinary team. Additional definitions of an AHP are delineated in Annexure-1.

In Australia, allied health is a broad term used to group diverse health professions with different educational standards, registration requirements, legislative controls and variable practices, leading to an identity crisis for the group as a whole.[17]Australia's health system is managed not just by their doctors and nurses, but also by the 90,000 university-trained, autonomous AHPs vital to the system.

The Canadian government has recognized the valuable contributions of this skilled and highly educated group of health professionals. The Canadian healthcare system is ensuring that the need for an appropriate mix and number is met over the long term.

In England, more than 84,000 AHPs, with a range of skills and expertise, play key roles within the National Health Service (NHS), working autonomously, in multi-professional teams in various settings. Though some of them may have a PhD and use the title 'Dr' (for example, psychologists), they are not medically qualified. All of them are first-contact practitioners, and work across a wide range of locations and sectors within acute, primary and community care. They perform essential diagnostic and therapeutic roles, with functions ranging from primary prevention to specialist disease management and rehabilitation throughout the care pathway.[18, 19]

In the South-East Asia region, AHPs provide an array of services in both urban and rural settings at various levels of care. Largely, non-physicians and non-nurses are described as 'paramedical health personnel' instead of 'allied health personnel' or 'auxiliary health personnel', terms which are commonly used in the Western world. Education and formal training of AHPs remains a neglected field in most South-East Asian countries, in spite of their growing importance in the delivery of healthcare services. In the absence of clearly laid-out training programmes, AHPs receive training in the public and private sectors, on the basis of widely varying curricula.[11]

The roles and job descriptions of AHPs are not clearly defined in many countries, leading to an inappropriate skills mix in times of changing healthcare needs. It is also seen that these professionals have a limited role in decision-making processes related to their work.

6. The situation in India

India's human resources for health are diverse and multi-faceted. They range from rigorously trained biomedical specialists and super-specialists to an assortment of community- and household-based healers. Half of this workforce is constituted by qualified doctors of allopathic or modern biomedicine, a range of paramedical professionals, policy-makers, social workers, researchers, health educators, promoters and technologists. The other half is full of the richness of India's traditional healing system.

The Ministry of Health and Family Welfare (MoHFW) has made a separate department for the traditional systems of medicine called Indian Systems of Medicine and Homoeopathy (ISM&H) in 1995, and renamed itin 2003 as the Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy, better known by its acronym AYUSH.

In India, the modern system of medicine, which has evolved from the country's colonial past, dominates the provision of health services, both in the public and private sectors, despite the government's support and attention to Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy.

Keeping in mind these realities and to keep pace with the advancement of medical science and development of new diagnostic and therapeutic techniques, there has been a quantum jump in the demand for AHPs. This has resulted in the establishment of a large number of institutions and centres for training these professionals, many of which are run without any supervision and control over the quality and standard of education. Given the crucial role that AHPs play in healthcare delivery, maintenance of proper standards in their training and education is essential.

On the other hand, the private health sector has grown exponentially in the country since 1949 currently accounting for 93 percent of hospitals and 85 percent of doctors in India.[20] It is therefore necessary to regulate these professions by setting up councils on the lines of the councils for pharmacy, nursing and other professions. In 2007, the Government of India proposed setting up separate councils for medical laboratory technicians, radiology technicians and physiotherapists/occupational therapists. These councils would be responsible, inter alia, for the maintenance of uniform standards of education in the respective disciplines and registration of qualified personnel to practise the profession.[21]

The MoHFW apprised the Parliamentary Standing Committee on Health and Family Welfare about the circumstances that necessitated the firming up of a Bill to set up the new council. The following problem areas that require regulation at the earliest were pointed out:

- Paramedical professions are not regulated
- Entry-level qualifications are different at different levels
- The level of knowledge and skills is not uniform, since the period of training differs from place to place and has no uniformity
- Course curricula are not uniform
- Fee structure and facilities in these institutions are not regulated
- Ethical standards are not uniform and are not being enforced

The government's various policy documents on AHPs club alternative health services (systems of medicine), ambulance services and allied health services under a single group. Although the Indian Public Health Standards (IPHS) has not distinctly defined a paramedic, the contents indicate inclusion of two kinds of functionaries – those who directly contribute to patients' healthcare delivery and those who maintain the health facilities.

The Madhya Pradesh Paramedical Council Act[22] and the Himachal Pradesh Paramedical Council Act[23] (both passed in 2003) cover professionals practising traditional systems of medicine (Ayurveda, Unani or Homeopathy) who are regulated by their own separate councils at the central level. Since the central and state laws are applicable to these professions, practitioners in these states have to register themselves with both the councils. The Kerala Paramedical Council Bill describes a paramedical technician as 'an ECG technician, EEC technician, EMG technician, X-ray technician, medical laboratory technician or ophthalmic assistant, and includes such other technicians as may be specified and notified by the government as paramedical technicians from time to time'.[24]

7. Challenges with the present allied health education system

a) Training systems and institutions

Training for allied health services in India is conducted by institutions ranging from government-affiliated universities, distance-learning universities to public and corporate hospitals, medical equipment manufacturing firms and even pharmaceutical companies.

The lack of planned courses and institutions, non-uniform nomenclature for the existing courses, diverse standards of practice and lack of qualified faculty pose a threat to the quality of education and skills of the AHP.

Although there are professional associations for certain AHPs, for example, the Indian Optometric Association and the All India Occupational Therapists' Association, the fruitful engagement of these associations remains to be explored. Lack of definitive and uniform criteria regarding essential qualifications for the classification of faculty, nomenclature for faculty, entry of faculty (direct versus lateral entry) and absence of faculty development programmes perpetuate the challenges pertaining to the quantity and quality of AHPs.

The availability of educational resources such as libraries, simulation centres and modern information technology tools at various centres is also variable. While established centres managed by large medical institutions offer a reasonable level of facilities, the educational resources are abysmally poor in stand-alone centres or smaller set-ups.

b) Infrastructure

A literature review and field visits indicate that most institutions lack separate infrastructure and dedicated teaching/learning aids for allied health services. Some allied health schools have instituted modern methods. For example, Manipal University has a common simulation laboratory and library for all the students pursuing healthcare sciences, the Johnson and Johnson Ethicon Institute of Surgical Education has animated

laboratories across India for imparting hands-on training to medical and allied health professionals. The Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Guru Gobind Singh Medical College, Faridkot have learning resource centres.

c) Training programmes and methods

The education and training courses for AHPs in India range from short-term (up to three months) certificate and diploma courses to graduate level, postgraduate and even doctorate programmes.[11] However, there are discrepancies in the structure and content of the same courses in different areas across India. Some courses are well organised and are certified by proper universities or associations but most are not under the ambit of any university and have evolved as demand for services grew. Therefore, there is a need for standardisation of the course curricula and regulations.

Availability of competent faculty is the key to quality education. Most institutions in India do not have a separate wing of teachers dedicated to allied health sciences. The result is that the existing graduate and postgraduate students do not get the right training that would enable them to take up teaching positions. There is an acute shortage of dedicated faculty. Teaching in allied health is predominantly done by medical specialists. No attention is paid to faculty development to ensure uniformity in teaching methods. Incentives that could motivate AHPs to take up teaching jobs are inadequate. On top of that, the best students are absorbed by the market with better salary offers. Hence, there is a need to attract good students in universities and institutions to take up teaching as a career. There are no simple and quick-fix solutions, as it takes several years of hard training to groom a competent teacher in any branch of higher learning.

The faculty development programmes or other efforts to develop teaching capacity in medical education need to look beyond 'clinical competence' and 'scientific research skills'. They have to focus specifically onprofessional skills development for teaching among the faculty. Most institutions do not have an orientation programme or training-of-trainer protocol.

d) Curricula

Central institutes such as the All India Institute of Medical Sciences (AIIMS), New Delhi; PGIMER, Chandigarh; and Jawaharlal Institute of Post-graduate Medical Education and Research (JIPMER), Puducherry, and autonomous institutes such as the Manipal College of Allied Health Sciences (MCOAHS), Karnataka and Christian Medical College (CMC), Vellore run a variety of allied health programmes with a structured curriculum. However, there is a lack of uniformity in the existing curricula and standards of training between these institutions.

For the same skills set, for example, medical laboratory technology (MLT); a range of courses exist at various institutions––a one-year course, a certificate, a two-year diploma, and a three-year degree programme.

There is wide variation within these courses with regard to the content of the curriculum and type of training. For example, for the BSc MLT programme at the Armed Forces Medical College, Pune; 60 hours of general management is included in the course curriculum. However, this is excluded in most of the other institutions running the degree programme. The curricula of these courses vary even within institutes affiliated to the same council. For example, in Optometry, CMC Vellore has incorporated dissection of the eyeball, which is not included in other similarly affiliated institutions.

e) Fee structure

Given the wide diversity of institutional ownership, it is not surprising that there is a lack of standardisation in the fee structure of these courses. While structured courses in government-run or reputed autonomous institutions such as AIIMS, PGIMER and CMC have a well-defined fee schedule with a nominal entry fee, the fees payable at private institutes and smaller set-ups are much higher as the fee schedule is designed

to generate profits for the institute. Ill-informed candidates often get cheated by fly-by-night operators marketing education for AHPs.

While some of the courses offer a token stipend to the candidates in lieu of their supportive services in running laboratories or departments, the remaining courses have no such provision.[25]

BOX 2: Role of the private sector in shaping allied health services

The private sector has played a significant role in strengthening paramedical/allied health education in both developed and developing countries.

According to the WHO, 'Several countries have private human resources for health (HRH) pre-service training schools and governments facilitate or stimulate investment by private sector pre-service training capacity to alleviate public sector capacity limitations that otherwise constrain HRH scale-up. WHO advises governments to streamline approvals and accreditation processes, offer tax breaks, or provide scholarship support for student tuition payments and also seek partnerships with the private sector to encourage contributions to investments in public institutions.'[26]

In USA, for example, the 'California Hospital Association recommends creating an allied health initiative to incentivize public private partnerships (PPPs) for allied health workforce education and training. This initiative is to be modelled after the successful Nursing Education Initiative, which created a multi-agency task force to address California's critical shortage of registered nurses, wherein PPPs have proven very effective in addressing the need to expand programs, increase faculty supply, and provide additional clinical training sites.'[27]

In India, realising the challenges of producing an adequate number of AHPs with appropriate competencies, several private sector players have set up training institutions. In addition, the opening of super-specialty hospitals has led to the incorporation of the latest technology and techniques in healthcare. This has encouraged the private sector to get involved in pre-service education. Several groups in the private sector have introduced simulation laboratories–a tool for accelerating skill-building of the allied health workforce by decreasing the demand on clinical sites.

The Confederation of Indian Industry (CII) believes that 'private partners can play a key role in capacity building and training through PPP modes to better utilise the infrastructure of government hospitals. The government can encourage private sector interest through initiatives such as provision of tax incentives, and permits corporates to undertake healthcare for optimised use of resources'. For example, a medical college with a 500-bed capacity could produce 150 students annually, instead of the 100 as per the current MCI norms. A CII policy paper points out that 'capacity building and training initiatives by the government need sharpened focus not only for a quantitative increase in trained manpower but also for improving the effectiveness of existing methods in training'.[28]

8. Medical dominance and medicalization: their effect on and perception of AHPs

In India, there is a conspicuous lack of recognition in the form of accreditation, quality control, career plan and respectable pay scales for AHPs. That there is little involvement of AHPs in policy development related to their work highlights the doctor-centred nature of medical services.

Focus group discussions with AHPs have revealed that most of them work under the shadow of doctors and they hardly get any recognition in society. People go for these careers only when they have no other options in the health sector. The profession of a paramedic/AHP is not a coveted career choice for the student pool in the country. Usually, only students from the poor strata of the society join the allied health professions. The middle and upper classes prefer to join medical/engineering/management streams.[29]

Physicians generally view AHPs as non-medical staff. As a result, they seem unwilling to permit AHPs to undertake tasks that they consider medical in nature. Several factors have contributed to the uneven power balance between doctors and AHPs. As American physician and educator, Leon Kass, points out,

> *'...all kinds of problems now roll to the doctor's door, from sagging anatomies to suicides, from unwanted childlessness to unwanted pregnancy, from marital difficulties to learning difficulties, from genetic counselling to drug addiction, from laziness to crime....'*[30]

According to American academician and sociologist, Professor Eliot Freidson, medical dominance has at least three components:[31]

- Trust, faith and confidence by the public in the medical profession;
- A position of authority based on exclusive command over a body of specialised knowledge; and
- Dominance in the division of labour, that is, control over other health professions.

There appears to be an increasing 'health–illness–medicine' complex in society, wherein people seek medical solutions to various problems that are not medical in nature and consider them as illnesses. Medical dominance coupled with what is called 'medicalisation' is considered to be a major reason. Medicalisation, therefore, has not only broadened the scope of medicine but also raised its status. It reinforces the image of medical practitioners as being omniscient and omnipotent, and compels societies to allocate continually growing proportions of gross domestic product to their preferred healthcare services.[32]

To these may be added the privilege of self-regulation, where by the profession regulates the behaviour of its members and monopolises decision-making and the use of resources. Medical dominance of healthcare has traditionally been the organising principle in the healthcare delivery system. Medical power is manifested through the professional autonomy of doctors, their pivotal role in the economics of the health services, their dominance over allied health occupational groups, administrative influence and the collective influence of medical associations.

The clear hierarchy of occupations established through the growth of hospital medicine is attributed to be a major contributor to the dominance of medicine in the division of labour.

Thus, high medical domination has been instrumental in lowering the status of AHPs in the eyes of people and is the one of the reasons for the low morale and self-esteem among AHPs. This needs to be addressed immediately if they are to contribute meaningfully to the well-being of the people.

Addressing medical dominance: viewpoints

In many countries, notably the United States, the United Kingdom, Canada and Australia, policy rationalisation by their governments have facilitated the release of AHPs from medical dominance. The Pew Health Professions Commission report (1995), titled *Critical challenges: revitalizing the health professions for the twenty-first century,* observed: 'The needs of the integrated systems will not be met simply by hiring [new] public health professionals [but by] substantial and ongoing retraining of nurses, physicians, allied health personnel, and managers . . . [who are] required to apply the skills in new contexts.'[33] The report calls for creative and risk-accepting leadership in providing training and education, a 'renaissance' in educating public health professionals. Training and re-training for public health should be based on competencies, that is, the focus should be on what people should be able to do, rather than what they should know.[34]

Professor Donald M. Berwick, President and Chief Executive Officer, Institute for Health Care Improvement, and Clinical Professor of Pediatrics and Health Care Policy, Harvard Medical School in the Foreword of the book Managing and leading in the allied health professions, makes a strong case for de-medicalisation and eliminating medical dominance when he raises and answers several pertinent questions as follows:

- 'Allied to what?': '...the continual pursuit to relieve suffering for those we serve.'
- 'In what way "professional"?': 'In the willingness to subordinate self-interest and prior assumptions to the pursuit of continual improvement in our effectiveness as a team, and to redraw the boundaries in the status quo.'
- 'Why "health" and not "healthcare"?': 'To broaden the base of our capacity to serve.'
- 'Are physicians, too, "allied health professionals"?': 'Of course. Why would you even bother to ask? We are all on the same team.'

In India, too, the need and approach to address the issue of medical dominance is well articulated in the report of the Mudaliar Committee (1962), which made some important recommendations regarding the scope of utilisation of AHPs.[35]

- The institution of a Master of Science degree, which will be available for graduates in science who have taken up mathematics, physics, chemistry, botany or zoology, is rewarded. There is a wide field for useful employment of such graduates and postgraduates for medical relief both in the public health department and in many institutions; and
- It is essential that a large number of technicians be trained for multipurpose duties in the field of medicine. It is felt that all district headquarter-level hospitals and large hospitals with a bed-strength of 200 can train these technicians. The period of training may vary from one year to two years, and persons to be taken on for training must be those who have completed their school final or equivalent course.

Presently, besides medical and nursing personnel, medical auxiliaries are crucial for assisting doctors and public health workers.

Acknowledging the medical bias, the Mudaliar report notes that:

> *'The growth and development of health services and manpower over the Five-Year Plan period reveals that health services and health manpower have been developing in an isolated and non-rational manner; and there has been far less concern, almost amounting to negligence, for the planning and production of allied health professionals as compared to that for medical manpower. Indeed, the primary reason for this is the medical bias in the entire process of health system planning and health manpower development.'*[35]

9. Relevance of defining allied health professionals now: political and social environment

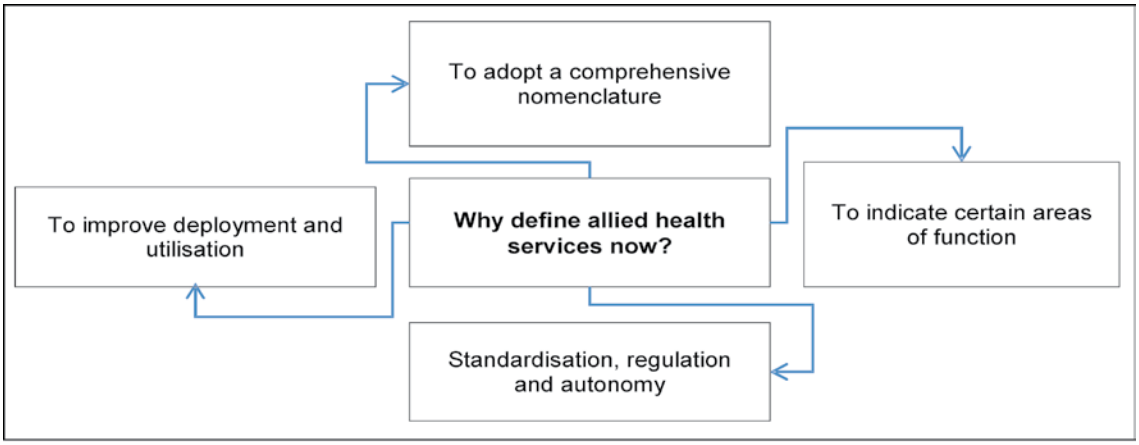
AHPs are woven into the fabric of public health in India. They are in the vanguard of creating a service based on people 'being healthy' rather than a service based on 'fixing ill-health'. Empowered AHPs can be the leaders of change.

With a vast variety of allied health professions present today and with newer categories coming on board each day, India too, faces a challengeas different states have been using different definitions to describe this ever-growing field.

There is a wide variation in the understanding of the concept of paramedic in India. The nomenclature and functions vary widely. No concerted initiative has been taken to understand the roles and responsibilities of AHPs, the governance and regulation issues of the sector, and deployment strategies in the Indian context. The roles and responsibilities conferred on a paramedic are largely decided by the programme under which she or he is employed.

There is a strong case to, therefore, standardise a comprehensive definition of AHP for the overall regulation, deployment and development of this growing cadre (Figure 2).

Figure 2: Need to define allied health professions



BOX 3: Experiments and experiences in career planning

Results of a study by Thomson and others (1991) in Houston showed that only 8 per cent of respondents expressed an interest in allied health as a career choice. Many were even unaware of what an AHP is. The results of this study were consistent with other reports suggesting that new strategies must be employed to promote greater participation in allied health, especially where there is under representation in these professions.

In 1996, the Association of American Medical Colleges launched the Health Professions Partnership Initiative (HPPI) to increase the representation of minority communities in the health services. Under the HPPI, health profession schools were to link with neighbouring colleges and schools to improve curricula in ways that would attract students to health careers.

Among the many medical colleges to implement the HPPI was the Creighton School of Medicine. The overall goal of the Creighton Collaborative Health Professions Partnership was to implement programmes in partner institutions, which would increase the academic achievements and health career preparation of students from the minority communities and ultimately translate into enrolment in the college's health professionals' programme.

Feedback surveys after the programme revealed changed perceptions. Students who earlier only identified 'doctor' and 'nurse' as medical professionals, now named more specialised choices, including many in the realm of allied health after presentations from various AHPs.[36]

However, in India, career counselling generally does not include these options for students, nor are these courses advertised in schools.

In the United States, 'programs guiding youth through a pathway to employment in allied health occupations take many forms…. Such programs can focus on in-school youth as early as middle school to point students in the direction of allied health opportunities. In contrast, programs can be directed to older out-of-school youth who require specific assistance to transition them through education and training and on to employment in an allied health occupation or one leading to allied health. Job shadowing is an approach being used by the Lehigh Valley, Pennsylvania Workforce Investment Board program and the ECHO program in Lafayette, Louisiana.'[10]

BOX 3: Experiments and experiences in career planning

According to the study titled Allied health access: how to develop programs for youth in allied health careers published by the U.S. Department of Labor Employment and Training Administration, developing an allied health programme for youth requires the inclusion of three principal partners:[10]

- The agencies responsible for recruiting, enrolling and supporting the youth on their career pathway;
- The institution responsible for training and/or educating the youth; and
- Health industry employers.

It further says, 'In most situations, recruiting and enrolling the youth will be the responsibility of community-based organisations. Training and education for allied health occupations is often provided by community colleges but this can vary, based on the specific occupation. Employers are most often hospitals and other major healthcare providers. Other partners can be included, such as agencies providing supportive services.'

10. Key issues and policy considerations for augmenting allied health capacity

The continuously changing health needs and service requirements influence the allied health ecosystem in terms of both service provision and education. In today's scenario, it is imperative to keep the right balance between curative, preventive, promotive and rehabilitative healthcare. AHPs play an important role in providing all these levels of care and hence must get their due recognition and status in the healthcare sector.

In this era of globalisation, it is also essential to prevent the brain drain of AHPs, besides ensuring optimum utilisation of skilled human resources to meet the service requirements of the healthcare delivery system. Due to the intricate nature of the sub-specialties and undefined work profiles within the allied health professions, there is intense overlapping of roles and responsibilities, leading to an unnecessary work overload.

In order to have a defined career pathway for AHPs, there should be an emphasis on developing their managerial skills. Concerted efforts should also be made to understand the relationship between allied and other health professionals to overcome any resistance and bias from the medical profession.

The cost of training and skills development methods required to train professionals is on the rise as is the cost of inputs such as physical facilities, teaching and learning resources. This puts additional pressure on attempts to upgrade the education, re-training and other forms of continuing education of trainers and trainees. Training has become more commercialised and competitive with the increase in recognition of institutes in the country and abroad, and with local institutes being compared with their foreign counterparts.

There is a pressing need for licensing/accreditation of training institutes. It is also important to reorient the education at these institutes with new approaches, introduce new methods for training and more self-directed learning that emphasises learning processes rather than content. This realisation has led to a more vigorous training curriculum, with an increase in the duration of training, improvements in entry requirements and selection criteria, collaboration and sharing of resources between the allied health services and the education sectors.

11. Recommendations

The wide variation in the understanding of the concept of allied health professional, better known as 'paramedic', the nomenclature, and functions has led to the poor image of allied health sciences. Despite a huge demand for services from this sector, the allied health sciences domain is highly fragmented. The government currently has limited options for employment, numbers for which need to be re-examined. It is hence essential to address the issue of perception urgently.

The use of the word paramedic itself limits the activities of AHPs in the system. Hence, it is imperative to adequately compensate these professionals based on their qualifications and specialities. There should also be a defined career pathway, salary structure and cadre formation to ensure their growth prospects.

Recommendation 1

Establish standards and acceptable terminologies for the various professionals who form a part ofthe allied health services, starting with the group being referred to as allied health professionals (AHPs) in lieu of 'paramedics'.

a) Recommended change in terminology from 'paramedics' to 'allied health professionals'

It is critical to undertake a complete reorganisation of the various categories of AHPs based on educational levels and specialty qualifications to match international nomenclature and highlight their importance as vital team players in the healthcare delivery system. There is a need to bring clarity into the way these health professionals will fit into the system with other professions such as medical, nursing, etc. Thus, we may define AHPs as follows:

> *'Allied health professionals include individuals involved in the delivery of health or related services, with expertise in therapeutic, diagnostic, curative, preventive and rehabilitative interventions. They work in interdisciplinary health teams including physicians, nurses and public health officials to promote, protect, treat and/or manage a person's physical, mental, social, emotional and environmental health, and holistic well-being.'*

Standardised nomenclature may improve the overall perception and image of the allied health sciences, as well as streamline career progression, so that promotional levels and associated pay grades may be standardised accordingly.

In view of the varied and inappropriate terminologies used currently, a set of uniformly accepted terminologies is hence recommended based on the qualification of the personnel working in the allied health cadre, as it has a bearing on the training courses and on the jobs for AHPs.

Table 2: Recommended terminology

Qualification of the allied health personnel	Recommended terminologies
Degree holders	Allied health professionals
Diploma holders	Allied health providers
Certificate holders	Allied health workers

The Government of India should include more occupations in their list, as allied health is a vast field and encompasses every specialty in health- and hospital-based services, including the community. Hence, the courses should range from certificates to diplomas, graduation, post-graduation and doctorate. This would increase the scope of the work and ultimately attract many more prospective students by choice. Each level of education in the field should comply with University Grants Commission (UGC) norms. This is essential to promote a uniform level of education imparted across all institutes throughout the country. Therefore, it is recommended that a standard duration for each level of education in the field be followed to promote uniformity.

Table 3: Levels of courses recommended for allied health personnel and their duration

Type of course	Duration	Internship
Certificate courses	1 year	3 months
Diploma courses	2 years	6 months
Graduate courses	3 years	1 year
PG Diploma	1 year	6 months
MSc courses	2 years	6 months (teaching/research)

A list has been compiled of 139 courses that fall within the purview of existing, emerging and essential cadres in the Indian healthcare system. This may be revised as more professions emerge in the near future spanning diagnostic, curative, non-direct, rehabilitative and community-based care. (Refer to Annexure-2 for the Recommended list of professions).

Currently, due to the absence of a central regulatory authority for AHPs and courses, they are divided into smaller groups, appearing to be 'regulated' by independent professional bodies at the national and state levels. For instance, the rules or norms of professional practice vary from extremely professional and well-organised groups such as physiotherapists, optometrists and speech and audiology professionals to diffuse groups such as operating room technicians and radiation therapists.

For the allied health cadre to grow in the healthcare system, these professional associations need to be bound by a common authority that will help AHPs to flourish as a family rather than different classes within the community of the healthcare system. The role of regulating both the profession and professionals cannot be an optional path but rather a condition for participation in the profession.

Considering the vast arena of these terminologies, it is also very important to draw a definite line of boundaries to define the task distribution for each, along with other issues of task shifting or the pattern of task sharing, etc. National and international evidence suggests that doctors are overburdened due to which the shift in healthcare is now increasingly based on a team approach, with shifting tasks and care by protocols, resulting in many tasks being delegated to other levels. It is thus imperative to structure a taskforce which would play an important role in generating awareness and thereby improving the perception and image of allied health sciences.

b) Formation of a specific multi-stakeholder taskforce

A specific multi-stakeholder taskforce needs to be formed comprising personnel from the Medical Council of India (MCI), Allied Health Sciences (AHS), Indian Nursing Council (INC), and the industry.

i. This taskforce should advocate for the important role played by AHPs and also highlight the advantages of all non-invasive and preparatory work done by them. Clear roles and scope of

AHPs should be chalked out so that their role as important team members is well known. An awareness campaign should be launched for AHS based on the target audience–higher secondary students, college students, parents and various health councils.

ii. Career counselling should be promoted at the school level to create awareness among candidates on the options available in the allied healthcare field, and they should choose their option rather than face limited options elsewhere.

iii. The following activities can be undertaken to increase awareness of the allied health sciences among the general public so that more and more persons want to join the profession:

- Develop comprehensive information material including details of the profession, institutions conducting courses, career options at various levels and lateral entry options, for use in campaigns and awareness building.
- Develop a film on the important roles of the different allied health streams at various levels.
- Develop an awareness campaign for AHS based on the target audience. For higher secondary students, college students and the general public, use various media and forums that are popular among the youth such as Facebook, blogs, videos on YouTube, electronic and interactive media. For parents and teachers, presentations during parent–teacher meetings and the use of electronic and print media can be productive. In all institutions, workshops, seminars and events should be carried out. Career counselling in schools and colleges and career fairs should include the various courses ion allied health sciences.
- Promote career exposure activities such as volunteering, internships, summer programmes and observation sessions in various allied health occupations in clinical settings, and opportunities for these should be made available so that students get a good exposure to the career before joining.
- Involve all science schools, colleges, vocational training institutes, community colleges (especially those related to the Indira Gandhi National Open University [IGNOU]) for wide publicity.

Recommendation 2

Establish an overarching regulatory body for allied health professionals (excluding doctors, nurses, dentists and pharmacists).

We propose that a National Board for Allied Health Sciences be set up as an interim measure to undertake the work of capacity augmentation and reorganisation for this group of the healthcare workforce. The proposed regulatory structure would be responsible for ensuring standardisation and putting in place quality control mechanisms for educational institutions, teaching methods, clinical protocols, workforce management and any other related issues. (The NBAHS framework has been modelled on the lines of the Bill NCHRH that was recently presented in parliament.)

a) Development of standards

Courses should follow international standards so that they are widely accepted and receive worldwide recognition. Students passing out from the colleges should be in great demand and get good jobs. The pedagogy should hence lead to a recruitable product; therefore, it is very important to keep abreast of current knowledge and maintain good liaison with the industry. Course delivery, practical training and assessments should be standardised. Committees should be formed to look into all aspects and standardisation. Standardisation should incorporate demonstration of learning as well.

b) Certification of courses

Degrees and certification should follow university norms or technical education certification, as would be mutually decided by the National Board of Education (NBE), state governments and universities. This is imperative to bring uniformity into educational standards and a relatively standardized career

pathway for the AHPs (Annexure- 3).

Recommendation 3

Undertake reforms to address and correct the varied supply–demand gaps in the allied health workforce in both the public and private sectors, with special consideration for geographical and epidemiological needs.

Increasing the capacity of the public sector would involve the creation of new AHP courses adaptable to a modern health system in order to ensure task shifting and resource maximisation of the otherwise short supply of doctors and nurses. Ensuring standardised accredited course curricula that are skills- and competency-based, and engaging actively with the private sector in a PPP model will greatly improve employment opportunities and thus reduce the human resource gap.

The allied health sciences education capacity in the country requires overall expansion. Education methods and techniques, over the years, have undergone a sea change and these need to be incorporated, including adult learning techniques. The curricula need to incorporate several soft skills and information technology (IT), besides introducing a large number of courses relevant to the needs of today. The availability of skilled AHP can be increased through:

- Increasing the intake capacity in various allied health courses
- Introducing new allied health courses (e.g. phlebotomy)
- Encouraging lateral entry in various allied health courses
- Encouraging institutions to institute degree-level courses
- Facilitating existing institutions to include allied health sciences.

The 11th Five-Year Plan recommends that every medical college should have a nursing college for degree courses in nursing and every district hospital should have a nursing school for certificate and diploma courses in nursing.

i) Planning of allied health education should address the careful projection of the need–availability gap in the education/training capacity in the country for various specialties. The expansion of training/ education capacity should be linked to career planning, with the development of a live register of AHPs, which should include disaggregated data relating to the various specialties, level of qualifications, availability of faculty, etc.

ii) Protocols should be developed for undertaking education in new, cutting-edge courses and disciplines for which the demand may be limited. It is very important to ensure that there is no glut in the number of AHPs available and that they are gainfully employed in the country.

iii) The cost of education should be reduced or students supported through the provision of low-interest student loans, scholarships and bonds or moratorium.

iv) Basic allied health education should be included as a part of public health.

v) Basic allied health education should be provided at the district level by setting up of allied health sciences schools, which should be attached to the district hospitals. A dedicated faculty similar to those at ANM training centres should be in place.

vi) The faculty will have to be developed for the district allied health institutes by imparting skills for teaching to the district hospital personnel. Incentives should be given to such persons to motivate them to teach.

vii) National and regional institutions of excellence should be set up for allied health sciences education.

The Government of India has approved the setting up of national and regional institutions of excellence for allied health sciences education. The National Institute

of Allied Health Sciences, which is being established at Najafgarh in New Delhi, is mandated to be the prime institution of excellence for allied health sciences education. It is expected to discharge multiple roles in the arena of building the allied health sciences pool in the country. In order to create capacity for training and opportunities for practical experience, the NIAHS is mandated to develop affiliations with institutions located at Delhi and other states. These affiliations may develop in the form of off-campus sites, and affiliate and satellite centres.

Maintaining the quality of institutions inspite of competition and increasing commercialisation is a great challenge. Due to commercialisation of the education system, the cost of education has risen considerably in the recent past, which has limited the capacity of the population to access quality education pertaining to the allied health sciences. The demand for specialised services is also increasing and needs to be kept in mind while addressing the shortage of personnel.

In the context of the issues mentioned above, there is a dire need to reduce the cost of education and support students who project a willingness to pursue these sciences. Our experts have suggested the following measures to augment capacity.

a) Reducing the cost of education or supporting students of allied health sciences

The shortage of personnel can be addressed by encouraging students to enrol in allied health science courses. Hence:

i. Provisions should be made for low-interest student loans through negotiations with banks.
ii. Scholarships should be given to meritorious students.
iii. Bonds or moratoriums should be instituted by the government for students to work in specified hard-to-reach areas, and for those students for whom the government pays fees. For those persons who default on their agreements, high penalties commensurate to the fees sponsored should be charged.
iv. Additional payments should also be considered for the faculty working in institutions set up in difficult areas.
v. The scope for part-time work should be considered with the possibility of hiring people on an hourly basis, as the willingness to work full time may vary. This will be useful in supplementing the funds available with students for completion of their studies. Hence, avenues for ad-hoc arrangements should be instituted.

b) Increasing allied health occupations in government institutions

It is well known that government institutions, especially tertiary hospitals, district hospitals, sub-district hospitals and a large number of community health centres (CHCs), are overloaded with patients. There is a dearth of specialists and doctors are unable to cope. It is also seen that there is an acute deficit of allied health staff in the basic scope of services. With the strengthening of district hospitals and advancement of technology in areas such as echo machines, pulmonary function tests laboratories, CT scans, MRI and oncology services, the need for support staff is large and people with appropriate skills have to be available to facilitate services. Thus, it is essential to undertake the following measures:

i. This problem can easily be addressed through the recruitment of AHPs who can take care of the primary needs and screening in every specialty of healthcare, starting with the care of emergency patients in the ambulance to writing down case histories, taking the blood pressure, preparing patients, doing the initial ophthalmic examination including visual acuity, preparing equipment, etc.
ii. Hence, more AHPs need to be inducted in PHC up to the tertiary-care levels.
iii. A detailed assessment of the scope of the AHP needs to be carried out in each area.
iv. There is a need to induct a wider range of allied

health specialists than just medical laboratory technicians, physiotherapists, ophthalmic assistants, X-ray technicians, dental technicians, etc. into the government healthcare system.

c) Recruitment of AHP

The first stage in engaging more AHPs is recruitment:

i. The recruitment process should be flexible, easy and fast. The entire process, from advertisement to selection, should not take long. Walk-in interviews may be conducted to ease the process such as those undertaken by the Haryana Government to fill vacant Medical Officers' posts in various facilities. Advertisements for government jobs should be attractive and various electronic media should be used.

ii. The job description and remuneration should be clearly spelt out. The pay scales should be the same for the same qualifications. Those persons willing to work in hard-to-reach or deprived areas should be given additional allowances.

iii. Recruitment should begin at the time when students are enrolled. Campus placements should be instituted as is done at all premier institutions in engineering and management. The government, hospitals, research laboratories and the industry should be encouraged to participate in campus placements. This will encourage more students to join the allied health sciences.

iv. Recruitment for future faculty programmes should also be encouraged to develop an academic cadre.

v. District cadres should be created so that persons are specifically employed in those areas and cannot be posted elsewhere.

d) Retention

Retention of AHPs needs to be seriously addressed. It is well documented that a large number of personnel leave the profession or migrate abroad or specialize in other streams where there are better opportunities and respect. Thus:

i. Retention strategies should be developed for various levels in the careers of the personnel.

ii. Professional development strategies need to be in place along with a clear career path. Continuing education and options for higher education are important mechanisms for retention.

iii. A good salary is very important for retaining people. Other issues are related to security, including social security, facilities for childcare, etc.

iv. Incentives for preference in postgraduate education, such as for doctors, are also attractive options.

v. Personnel working in difficult areas should be given the choice of their preferred place of posting after five years of rural service.

e) Strengthening and expanding the capacity of existing institutions of allied health sciences education

The government has already operationalised a large scheme for strengthening the existing allied health sciences education capacity in the country through a one-timegrant-in-aid to state medical colleges for expanding education capacity. This grant may be used for improving the infrastructure at the institutions or adding faculty, teaching aids, etc. The government may continue its efforts in this regard and also identify institutions of excellence in the non-government sector, which are engaged in allied health sciences education and strengthen them as well.

f) Establishing new institutions for allied health sciences training

This would remain the mainstay of the initiatives of the government for the next few years. New institutions for allied health sciences education and training would need to be set up in all states. As far as possible, all medical colleges must strive to set up a parallel allied health sciences training institution. The district hospitals in the country have become the hubs for training nurses and ANMs, and are also being

considered for three-year training of rural doctors. The large district hospitals may be identified as institutions for allied health sciences education also. The patient load at these facilities provides valuable training opportunities, and undertaking standardised courses in these institutions would expand the available allied health sciences pool in the country while making captive technical human resources available to the hospitals after the first year of education in most courses.

A mapping exercise of the geographical areas for the presence of AHS should be undertaken for each state. Institutions should be setup in difficult areas and those regions where there is limited presence or absence of educational institutions proving allied health education.

In the initial phases, training will be taken up by medical colleges, district general hospitals, and large private hospitals through physicians, nursing, and doctors in the preclinical and paraclinical fields. CII is planning to develop a curriculum that will contain standard instructions for the entire year, after which the candidate will get a certificate on completion of credit hours.

Multinational companies can take up training skills required for certain disciplines through a PPP model using the government curriculum with the autonomy to regulate with the government. Appropriate incentives/funding should be provided by the government for institutions to take up the training.

g) Instituting basic allied health education as a part of public health

Basic allied health education should be provided at the district level by setting up institutes attached to district hospitals and with a dedicated faculty, similar to that available at ANM training centres. The faculty will have to be developed for the district allied health institutes by imparting skills for teaching to the district hospital personnel. Incentives should be provided to such persons to motivate them to teach.

h) Strengthening community colleges for conducting allied health education

The community college is an alternative system of education, which is aimed at empowerment of the disadvantaged and underprivileged (urban poor, rural poor, tribal poor and women) through appropriate skills development leading to gainful employment. These colleges work in collaboration with the local industry and community to achieve skills for employment and self-employability of these sections of the society. The community college system has the advantages of easy access, flexibility in teaching methodology, cost effectiveness and equal opportunity.

BOX 4: Community Colleges

IGNOU has 128 affiliated community colleges at present, for which IGNOU has developed guidelines. IGNOU also plans to set up 500 such community colleges, and ultimately in every panchayat. The community colleges are regulated by IGNOU through committees, each of which has a representative from IGNOU.

A study should be conducted to assess issues that can lead to the strengthening of community colleges as community colleges generally have a two-year curriculum that either leads to an associate degree for transfer to an undergraduate college or to the students' direct entry into any occupation or trade. NIAHS can work with IGNOU in strengthening these colleges.

Strengthening community colleges in terms of having proper committees, faculty and standards is essential, as this may address the gap in the rural healthcare delivery system. It is also necessary that they gain recognition by the Ministry of Human Resource Development and the Directorate of Employment, and that training be carried out by the respective state governments so that students are encouraged to get an education at these colleges, which has national and regional acceptance. It will also ensure the horizontal mobility of students in terms of getting employment all over the country.

i) Augmenting the capacity of existing institutions and medical colleges in all states for quality allied health sciences education

There are over 350 medical colleges and approximately 940 stand-alone institutions based on desk review research (listed in Appendix-1) in the country, of which at least half can adopt a standard allied health sciences education regimen with standardised curricula, and entrance and exit examinations. The following activities will need to be conducted for strengthening these institutions:

i. Each state should map out all its allied health sciences training institutions, including their infrastructure, fee structure, courses conducted, faculty, students, equipment, teaching/ learning aids and other facilities. Based on this, efforts should be made to develop their capacities and move towards the standards set by the regulatory body.

ii. Institutions should be supported in developing their faculty and strategies formulated to overcome the shortage of faculty.

iii. These may be knitted together with the Regional Institutes of Allied Health Sciences (RIAHS) chain into a large, multi centre group of institutions for allied health sciences education. They may receive a centralised mandate for certification under the umbrella of the NIAHS. Medical college hospitals associating with such institutions stand to gain from the first year onwards as the students become available to work in the hospital laboratories.

iv. The medical faculty at the hospital may serve as the trigger faculty until sufficient students graduate to feed the faculty cadres. Within the hospital, the allied health sciences education institutions should not create large space requirements, as the facilities can be shared across various courses and subjects.

v. There should be flexibility within the hospital to adapt to the requirement of various courses. The technical skills of the students should be honed on simulation tools from the first year itself. Simulation tools are a cheap, effective method of building/evaluating the skills of students without exposing patients to unethical risks.

j) Provision of support to stand-alone institutions to make them financially sustainable

Institutions that do not have an attached hospital or medical college (stand-alone institutions) find it very difficult to be financially viable as they cannot charge high fees from the students. A study should be conducted to see how stand-alone institutions sustain themselves. The government should provide special grants and incentives to stand-alone institutions only if they provide quality education.

As seen during our research on the institutes in India, the path for a professional to move up the career ladder is blurred. This situation is prevalent in all specialties of the field. This long-ignored need to standardise the cadre structure and growth ladder has caused a great sense of dissatisfaction among professionals. A defined career pathway will not only help AHPs to excel in their respective fields but also encourage lifelong learning and professionalism.

Recommendation 4

Establish a clearly defined cadre structure for AHPs based on a combination of educational qualifications and years of work experience with a distinct career pathway for three tracks: clinical practice, academic faculty and management.

a) Cadre reforms

There is an immediate need for cadre reforms for AHPs. This will result in motivation of personnel and also encourage large numbers to join the profession. Cadres need to be created along the lines of the nursing profession:

i. Qualifications should be specified for every level.

ii. No new unqualified people should be allowed to enter technical work in the future. Existing people

should be certified through tests and assessments to come at par. The time limit should be five years for all persons to clear the exams. Bridge courses should be organised to support such persons.

iii. Service and teaching cadres should be developed.

iv. Grades and staff levels need to be clearly spelt out in terms of experience and qualifications in the service cadre.

v. In the teaching cadre, the levels can be instructor, lecturer, assistant professor, associate professor, professor and head of department.

vi. Health provider teams at all levels from the subcentre, primary health centre (PHC), CHC, district hospital to medical colleges should be defined. Peculiar inter-cadre relationships in India may prevent the senior cadre from mentoring even a closely related junior.

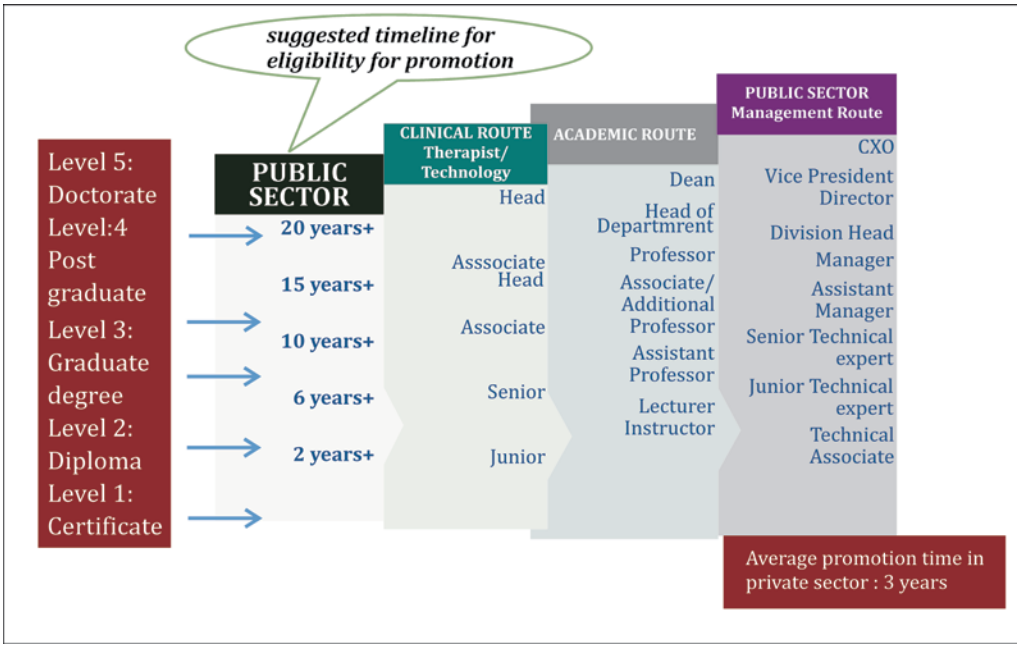
vii. A credit-based system similar to that in operation in the US or UK model should be developed for all allied health courses. This way, a student gathers coursework credits that he/she can use to move up the ladder in terms of promotion opportunities or to get higher qualification.

b) Defined career path

A career path is an essential element in maintaining the motivation levels of all personnel. Career paths for every specialty in the allied health sciences should be chalked out. There is a need to study each specialty and address this issue. Diploma holders can do graduation, then post-graduation and eventually a doctorate. Personnel can remain in the clinical field or become faculty or do both. They can enter research or become hospital administrators or even enter the civil services.

A clear path for lateral movement, change in specialty or multi-specialisation should also be addressed with shorter bridge course options for those professionals who may lack a higher-level qualification but make up for it with extensive work experience.

Figure 3: Recommended career pathways



c) Employment options

Huge opportunities exist for employment of AHPs both in the government and private sector. The following employment options are suggested by our expert group:

i. Medical colleges, allied health colleges, hospitals, nursing homes, clinics, diagnostic and research laboratories, wellness centres, spas, rehabilitation centres, and the equipment industry all need AHPs and their demand is increasing.

ii. It is necessary to define the qualifications of personnel required for each level of health facility. MSc degree holders should only be posted in medical colleges, academic institutions, district hospitals or research laboratories. At PHCs and CHCs, graduates and diploma holders can be posted.

iii. Part-time employment should be allowed depending on the workload, and in the case of women who have to look after their children.

iv. A national floor salary for each level and each cadre should be designed.

v. No contract employment should be adopted by the authorities and institutions, especially hospitals and facilities, which are primarily a source of employment for professionals.

d) Work norms and standards

The issue of work norms needs to be systematically resolved. Some professionals, such as radiologists, have clearly stated the number of clients they can attend to. The other specialties too should examine the number of clients / tests a professional can attend/ do in one hour and one day while maintaining quality. Too many patients per day or too many tests per day will definitely affect the quality of work. Calculations relating to the ratio of tasks to staffstrength need a separate consultation and comprehensive inputs from cadre experts. This will also help in calculating staff requirement. This exercise may be undertaken at a later time.

e) Human resource (HR) policies

HR policies need to be streamlined for AHPs. Efforts should be made to retain AHPs to prevent a large number of personnel from leaving the profession or migrating abroad or specialising in other streams where there are better opportunities. Thus, retention strategies should include professional development, continuing education and options for higher education, a good salary, social security, incentives for postgraduate education, etc.

Recommendation 5

Build an allied health science knowledge community through the creation of systems / mechanisms for networking, information sharing, real-time data capture and innovative research which will be responsible for all knowledge activities in allied health.

a) Establishment of an AHS information and resource cell

An allied health sciences information and resource cell should be established. This cell should be responsible for collecting and filtering all the information for the government, students, AHPs, the industry, etc. This information should be hosted on a dynamic website containing all allied health occupations, including details of courses and training institutions, career scope and options, job opportunities, research papers and articles, resource material and information on workshops or seminars or conferences. Discussion forums through blogs and solution exchange should be part of the website, besides providing counselling online and motivating unemployed youth to join the allied health sciences.

b) Developing a dynamic online database for each AHP

An online database shall be maintained on each AHP. Each person, on completing the course, should fill in an online registration form. Once the form is filled, it will generate a unique ID, a password and a printable document. A system of updating the database can be established by every individual using the unique ID and password. Each training institute will also enter all the details of individuals passing out on software developed by the National Board of Allied Health Sciences.

The online registration of individuals can be correlated with the training institutions' database through online software developed by the National Board or Council. The document should include all the details related to the special competencies of the individual, career history, training undertaken, education and qualifications of the AHP. When an AHP applies for a job, his/her history can be easily verified as all records are online and computerised. The details of each individual can be printed out if required. The advantage of this document is that all records of AHPs are available at one place, which will reduce time in cross-checking records.

c) Earmark research funds for improving quality standards for AHPs

Quality improvement can be implemented by establishing partnerships with international institutions of excellence and PPPs to bring out the best in the profession. The standards developed at the central and state levels should be in complete harmony with each other. More emphasis should be placed on research activities and funding provided at regular intervals either by the Centre, state, or foreign direct investment, etc., which can be used for the development of the research centres.

Along with augmenting capacity, it is also essential to focus on quality education. The government will need to develop a number of options for encouraging flexibility in allied health sciences education without compromising on the quality of education. Improvement in infrastructure and availability of faculty is a challenge that needs to be addressed, and the government should provide the required support.

12. Conclusion

Allied health workers constitute a vital part of the health system, both nationally and internationally. In the Indian context, however, their significance and role has been marginalised due to the prevalent culture of medical dominance and lack of a statutory body to give prominence to their contributions and concerns.

Allied health workers are an untapped treasure, and are critical to fixing the gaping holes in India's health workforce, particularly the severe shortage of physicians and specialists.

It would be a grave mistake to not utilise the capacities of this resource at a time when the government is bringing in critical reforms in public health and aiming to improve access to health by focusing on the preventive, promotive, curative and rehabilitative needs of the population.

While the government is considering strategies to best utilize AHPs, the private sector has realised their potential, and established several institutions and mechanisms to integrate these professions and professionals into the organised healthcare sector. However, the growing demand has resulted in the mushrooming of big and small institutions claiming to provide allied health education.

The need–availability gap is large but not insurmountable. A careful plan to expand the training capacity has to be drafted, which is discussed later in this report. While designing education in the allied health sciences in India, the changing demographical patterns and epidemiological transitions need to be kept in mind, besides globalisation, technological developments and information technology.

Planning for allied health education should address the following:

i. Carefully project the need–availability gap in the education/training capacity in the country for various specialties.

ii. Connect the expansion of training/education capacity to career planning in the public system. This would,inter alia, address issues of recruitment rules, cadre structures, remunerations, promotions, continuous education, etc.

iii. Develop a live register of AHPs with disaggregated data on the various specialties, level of qualifications, availability of faculty, etc.

iv. Develop protocols for undertaking education in new, cutting-edge courses and disciplines for which demand may be limited.

v. Ensure that there is no glut in the number of AHPs available and that they are gainfully employed in the country.

As the MoHFW gets ready to undertake a facelift for the entire allied health workforce by establishing national and regional institutes of excellence, the time is opportune for the government to study this provider group in detail; review existing inputs, processes and outputs; standardise institutions, educational tools and methods; revisit career paths and progression; and re-introduce these professionals into the public system to reap much-awaited rewards in the form of improved health outcomes for the population.

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Annexure– 1

Additional definitions of AHP

The **American Medical Association** in 1965 defined AHPs as 'A large cluster of health-related personnel who fulfill necessary roles in the healthcare system, including assisting, facilitating, and complementing the work of physicians and other healthcare specialists'. [1]

U.S. Division of Allied Health Manpower, in 1969 defined AHPs as 'All those professional, technical, and supportive workers in the field of patient care, community health, public health, environmental health and related research who engage in activities that support, complement, or supplement the professional of administrators and practitioners'.[11]

The **Pew Advisory Panel for Allied Health** in 1992 defined allied health as including all health-related disciplines except nursing, medicine, osteopathy, dentistry, veterinary medicine, optometry, pharmacy and podiatry.[1]

An AHP, as defined in section 799B[(5)] of the **Public Health Service Act (USA)** (42 U.S.C. 295p [(5)]) is anyone who: (A) has graduated and received an allied health professions degree or certificate from an institution of higher education; and (B) is employed with a Federal, State, local or tribal public health agency, or in a setting where patients might require healthcare services, including acute care facilities, ambulatory care facilities, personal residences, and other settings located in health professional shortage areas, medically underserved areas, or medically underserved populations, as recognized by the Secretary of Health and Human Services.

The **Association of Schools of Allied Health Professionals** defines AHPs as being involved with the delivery of health or related services pertaining to the identification, evaluation and prevention of diseases and disorders; dietary and nutrition services; rehabilitation and health systems management, among others.

In 2006, **Services for Australian Rural and Remote Allied Health (SARRAH)** members held a workshop to define allied health to guide strategic action for the organization. This definition is contained within the SARRAH Constitution: 'SARRAH recognises that allied health professionals are – tertiary qualified health professionals who apply their skills to restore optimal physical, sensory, psychological, cognitive and social function. They are aligned to each other and their clients'AHPs mean individuals other than medical staff members who are authorized by law and by the hospital to provide patient care services within the hospital.

[1]Douglas HE III, Drew CR. Allied health professions. 2004. Available at: http://www.bahaistudies.net/asma/alliedhealthprofessions.pdf
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Annexure – 2

List of allied health professions

Diagnostic	• Cardiovascular technologist • Medical and clinical laboratory technician • Cytotechnologist • Haematotechnologist • Histopathologist • Phlebotomist • Molecular technologist • Cytogenetic technologist • Dermatology/STD/leprosy laboratory technician • Radiological/imaging technician • Diagnostic medical sonographer • Blood bank technician • Neuro-diagnostic laboratory technologist • Sleep laboratory technician
Curative services	• Radiotherapist • Nuclear medicine therapist • Anaesthesia technician • Anaesthesia assistant • Perfusion technician • Neurophysiologist/END technologist • Optometrist • Ophthalmic assistant • Emergency medical technician and paramedic • Critical care technician • Critically ill children technician • Respiratory therapist • Medical assistant • OT technician • ICU technician • Dialysis technician • Nursing assistant • Dental assistant • Dental hygienist • ECG technician

	• EEG technician • EMG technician • Perfusion technician • Ultrasound technologist • Medical dosimetrist • Endoscopy technician • Urological technician • Palliative nurse • Mental health counsellor
Non-direct care	• Medical physicist • Dental laboratory technician • Dieticians and nutritionist • Medical appliance technician • Central Sterile Supply Department (CSSD) technician • Dark room assistant • Biomedical technician • Pharmacy technician • Medical transcriptionist • Medical recordstechnician • Health information technician • Physician assistant • Medical secretary • Medical and health service manager • Health and hospital administrator • Medical social worker • Hospital hospitality worker • Epidemiologist • Biostatistician • Health sanitary inspector • Nursing aide, orderly and attendant • Mortuary technician • Forensic technologist
Rehabilitative	• Physiotherapist • Occupational therapist • Speech–language therapist • Audiometry technician • Prosthetic and orthotic technician • Hearing aid and ear mould technician

Community related	• Community-based rehabilitation therapist • Multipurpose rehabilitation worker • Home-based care worker/home aide • Manager of community-based health programme

Annexure – 3

Protocols for certification of courses and quality control (evaluation) of desirable skill sets

Admission, award of Degree/Diploma and Certification by NIAHS

NIAHS at its inception will not be a university to award degrees. It is proposed that as a stop-gap arrangement, the National Board of Examinations will be the body for conducting entrance examinations, term-end examinations and awarding degrees.

Entrance examination

To effect this, the prerequisites are as follows:

i. Notification to the NBE for starting an Allied Health Sciences wing for the purpose. This would be necessary to protect any devaluation of their post-doctoral and PG programmes in medical education.

ii. The NBE will enter into an agreement or memorandum of understanding (MOU) with the NIAHS for conducting examinations and will be paid for the assignment according to the agreed terms and conditions.

iii. The NBE will conduct entrance examinations for admission into the NIAHS and RIAHS centrally using an electronic medium. The use of electronic media will facilitate deeper penetration into rural areas. The language of the test can be optional.

iv. Such arrangements can be made on the lines of the Central Admission Test (CAT), BITS Pilani, etc.

v. The selection list will be posted on internet and published in the regional vernacular newspapers. The reservation for entitled categories will be made as per Central Government rules on the subject.

vi. Choice of institution and stream will be done on merit cum availability.

Term End examination

i. The theory examination will be conducted by the NBE. The question bank will be provided by the NIAHS and each institution will use different sets. Question papers will be printed and dispatched by the NBE to the controller of examinations at the RIAHS and NIAHS.

ii. The concerned institutions will nominate external and internal examiners in advance from a pool already created by them. Each set of examiners can continue for two years as per university rules.

External examiners will evaluate the answer sheets and conduct practical examinations, etc. The answer sheets with evaluation rolls will be submitted to the NBE who will declare the results and subsequently award degrees after satisfying itself that the candidate has fulfilled all other criteria for such an award as per the curriculum.

Chapter 2

Regulating the Allied Health Profession

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Regulating the Allied Health Profession

1. Introduction

Allied health professionals (AHPs) have long been neglected in terms of education and career growth due to several factors ranging from medical dominance and policy gaps to lack of infrastructural support. This has led to growing dissatisfaction among the huge cadre of health professionals whose career prospects remain uncertain despite an abundance of talent and willingness to contribute.

The National Initiative on Allied Health Services (NIAHS) Secretariat was instituted by the health ministry to map gaps that require attention in the regulatory system as a part of health reforms undertaken during the Twelfth Five-Year Plan period. A considerable regulatory gap in the allied health space is attributed to the lack of a comprehensive regulatory framework and absence of centres for excellence or apex bodies for professional development and training of AHPs. The objective of this endeavour is to ensure the availability of quality human resources across the country to fill the demand in the public and private sector and reorient the medical conglomerate so that they recognise AHPs as an integral part of the service delivery mechanism.

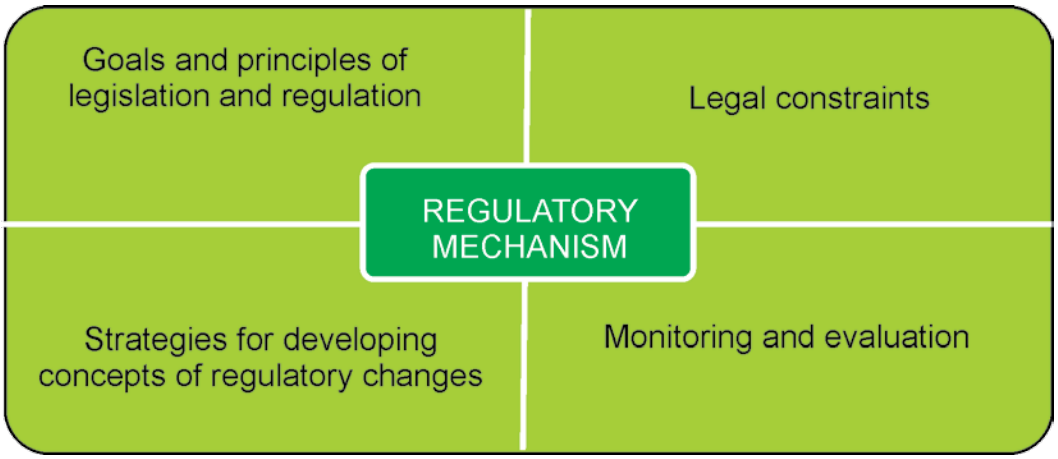
a) Definition of regulation

The prime objective of professional regulation in the field of healthcare is to safeguard the health and well-being of persons using or needing the services of registrants.[1]The key purposes of regulation are to improve performance and quality; to provide assurance that minimally acceptable standards are achieved; and to provide accountability both for levels of performance and value for money.[2]

The term 'regulation' can be defined in many ways. According to Philip Selznick regulation is: 'sustained and focused control exercised by a public agency, on the basis of a legislative mandate, over activities that are valued by the society', and more specifically in a healthcare context as 'any set of influences or rules exterior to the practice or administration of medical care that imposes rules of behaviour'.[3]

The Organisation for Economic Co-operation and Development (OECD) has defined the term 'regulation' to include: the full range of legal instruments by which governing institutions, at all levels of government, impose obligations or constraints on private sector behaviour. Constitutions, parliamentary laws, subordinate legislation, decrees, orders, norms, licences, plans, codes and even some forms of administrative guidance can all be considered as "regulation''.[5]

Figure 1: Various aspects of regulation



The intent of regulation is:

- To establish, monitor and enforce essential standards, improve and sustain education, training and practice; and provide a framework for allied health practice relevant to meeting the health needs of the population and protecting the public;
- To provide public authority, credibility, protection and support to permit AHPs to perform to the maximum extent of their capabilities;
- To promote regulation by AHPs themselves to ensure appropriate standards of education and practice;
- To permit and encourage AHPs to participate in and influence public debate on health policy; and
- To ensure that each of its practitioners is accountable to the public for their professional practice.(6)

b) History of regulation

Historically, medical professionals have enjoyed significant autonomy and freedom from external control. As a result, professional regulation has primarily been the preserve of an elite subset of the profession, manifested in various mechanisms of self-regulation.

With increasing entitlement literacy among patients, increasing complexity in medicine and frequent reports of poor performance, the ability and willingness of healthcare professionals to regulate them is no longer taken at face value. Increasingly, stakeholders outside the professions are seeking more detailed reassurance and explanation about the delivery of healthcare services. In many countries, there is a movement towards more rigorous and transparent regulation, effectively reducing reliance on the professions to monitor their own quality of care and remediate cases of poor performance.

A range of mechanisms have been used to regulate the healthcare professions, including the following:

- **Licensure:** The granting of legal permits to practice to individuals who demonstrate appropriate levels of knowledge, skill and competence. Mandatory licensure assures minimum acceptable levels of competence.
- **Registration:** The compilation of a list of individuals who have satisfied an authority that they are qualified to practice. In most countries a

medical register is maintained, either by state or government departments.

- **Certification:** An acknowledgement of a pre-determined level of achievement or performance, generally recognising achievements exceeding those set as minimum acceptable standards (such as those set for licensing purposes).
- **Revalidation and recertification:** Processes that require individual practitioners to maintain/ collect appropriate evidence to attest to the standards of their practice and to demonstrate their continuing competence. The use of these interventions is increasing as it is acknowledged that the validity of certificates and qualifications erodes over time and that skills, knowledge and competence require periodic reaffirmation.
- **Credentialing:** The systematic collection, review and verification of a practitioner's professional qualifications. This often includes using patient data to attest to the clinical competence of an individual in a particular activity (e.g. specific surgical procedures).
- **Privileging:** The granting of permission to perform specific professional activities under the jurisdiction of an organisation's (usually a hospital's) authority.[7]

c) Regulation and the market

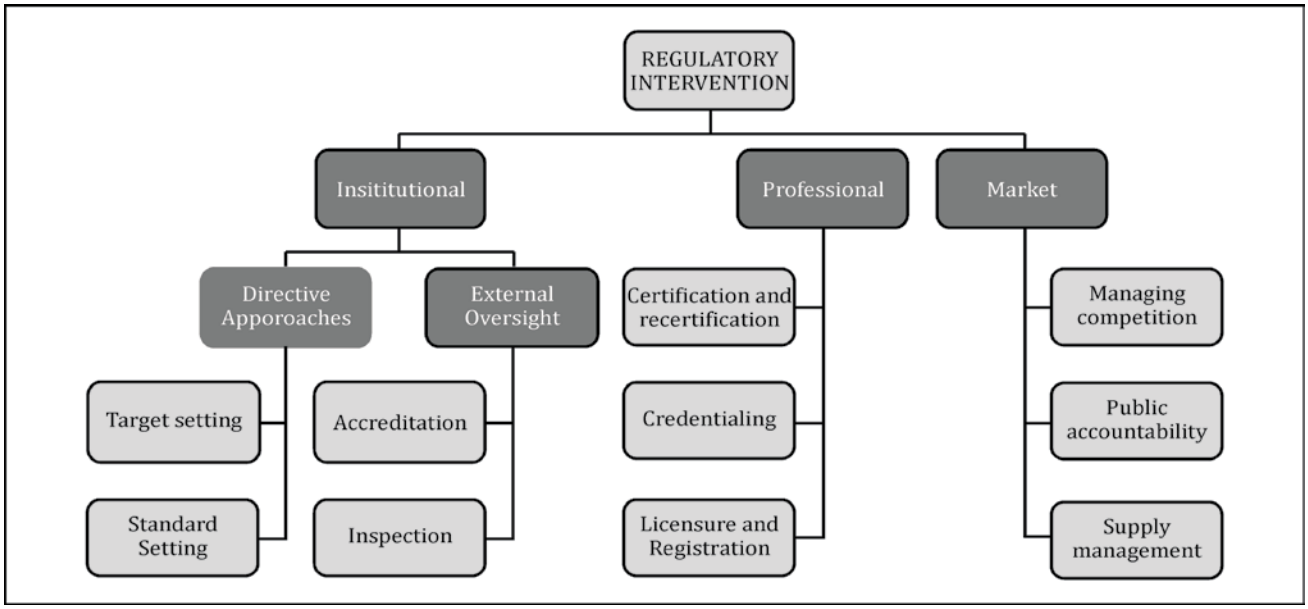
While India has an extensive legal and regulatory framework for public health delivery, there is a lack of a nuanced policy that nurtures human resources for health. There is also a disconnect between bureaucratic approaches to regulation and the realities of a health sector dominated by private players. There is an urgent need to introduce a regulatory framework to address the challenges of standardisation of care provided, rational use of drugs, free structures, etc.

Healthcare markets generally require regulatory interventions for the following reasons:

- **Managing competition:** Regulators act to ensure a 'level playing field' and allow market forces to deliver efficiency by limiting concentration of power in monopolies.
- **Patient protection:** Regulators protect the patient or the consumer by assessing the quality of services. They ensure that robust grievance and appeal procedures are in place to protect confidential patient data.
- **Public accountability:** Regulators ensure that consumers are able to choose from among the healthcare options available as per their expectations of cost, outcomes and needs in quality. To be able to make such choices, consumers require accurate information about healthcare services. Providers must also be held accountable for the services they deliver to the masses.
- **Supply management:** Through its expansion around the entire healthcare sector, regulation ensures that optimal conditions of participation and availability of care are maintained throughout. It also addresses the issues of over- and under-supply of services and other necessities.

Regulatory interventions need to be introduced at the institutional and professional levels along with creating a level playing field for public facilities by reining in the largely unregulated private market. The following approach can be used for the purpose as indicated in the figure 2.

Figure 2: Types of regulatory interventions



During the desk review phase of the NIAHS project the following key issues and concerns were identified:

- Lack of understanding of the Acts and their implications
- Confusion regarding the definition of allied health and who belongs to the profession
- Uncertainty regarding the role and benefits of a single Allied Health Council
- Varied expectations of what the composition of the Allied Health Council should be
- Uncertainty regarding the implications of registration and whether individuals would be able to register
- Defining a time frame of practice for staff returning to the workforce after an absence
- Need for a transitional period to enable staff without minimum qualifications to gain competencies that would enable full registration
- Identifying a source for competency examinations for those staff with extensive on-the-job training but no formal qualification.

BOX 1 CASE IN POINT

Central institutions such as the(SGPGI, AIIMS, and JIPMER) follow their own criteria and procedures for accreditation. The standards of professional practice are not available, and there is no central registry to enrol and track the AHPs in the country. In the absence of a central database, the information on the available and required number of AHPs is based on crude estimates, rather than the exact status and distribution. The comparatively larger cadres such as Physiotherapy, Optometry, Radiology and Medical Laboratory Technology, among others, who have stronger national associations, have been trying to push the agenda for formation of their professional councils through the government machinery. It is to be noted that formation of separate councils for each and every cadre will lead to confusion and conflict of powers, and encourage competition between the cadres, which may not develop in a healthy way to promote the allied health profession.

2. Situation in India

a) India's policy pipeline

A number of councils such as the Medical Council of India (MCI), Dental Council of India (DCI), Pharmacy Council of India (PCI) and the Indian Nursing Council(INC) have already been established by Government of India for regulating the standards of education and training, as well as the registration of practitioners in these fields. The aim is to prevent unqualified people from practising and also for maintaining the standards of these professions. However, there is no central regulatory mechanism for AHPs. Till date, only the states of Madhya Pradesh, Himachal Pradesh and Kerala have a statute governing the state paramedical council which regulates education, recognises courses and maintains registers. For education and training of AHPs, there are a number of courses ranging from short-term (up to 3 months), certificate, diploma and graduation.

Attempts are being made to create a regulatory framework on similar lines as the MCI and DCI. No consensus has been reached at the highest level.

b) Regulation of AHP's at national level

The absence of any statutory provision implies that the regulatory function is not appropriate. Rapid strides in medical technology have led to an increase in demand of support staff with various skills, and large cohorts of such on-the-job trained personnel have entered the field. There is no set process for recognising the new centres that offer training in various allied health programmes except for programmes under the Rehabilitation Council of India (RCI), MCI, INC and DCI. Though the RCI lacks statutory support, it regulates training programmes and training institutes in the rehabilitation and disability sector.

In view of the desperate need for a comprehensive regulatory framework to ensure uniform training, employment and standardisation for allied health services staff, the Paramedical Council Bill, 2007 was drafted and subsequently proposed in the Parliament. This Bill aimed to set up three councils to regulate physiotherapists and occupational therapists, medical laboratory technicians and radiology technicians, with minimum educational and professional standards for each. It mandated that every practising AHP be registered with the council. It was also proposed that all clinical establishments can only appoint those AHPs who are registered with their respective councils. Unfortunately, the Bill was pending and eventually lapsed, leading to a void across the allied health cadres.

Professions with large cadres such as those for physiotherapy, optometry, radiology and medical laboratory technicians, which have stronger national associations have, therefore, been trying to push the agenda for the formation of their professional councils through the government machinery. It is to be noted that the formation of separate councils for each and every cadre will lead to confusion and conflict of powers, and encourage competition between them, which may not develop in a healthy way to promote the allied health profession.

Due to this absence of a standard-setting body in the field, the following problems arise:

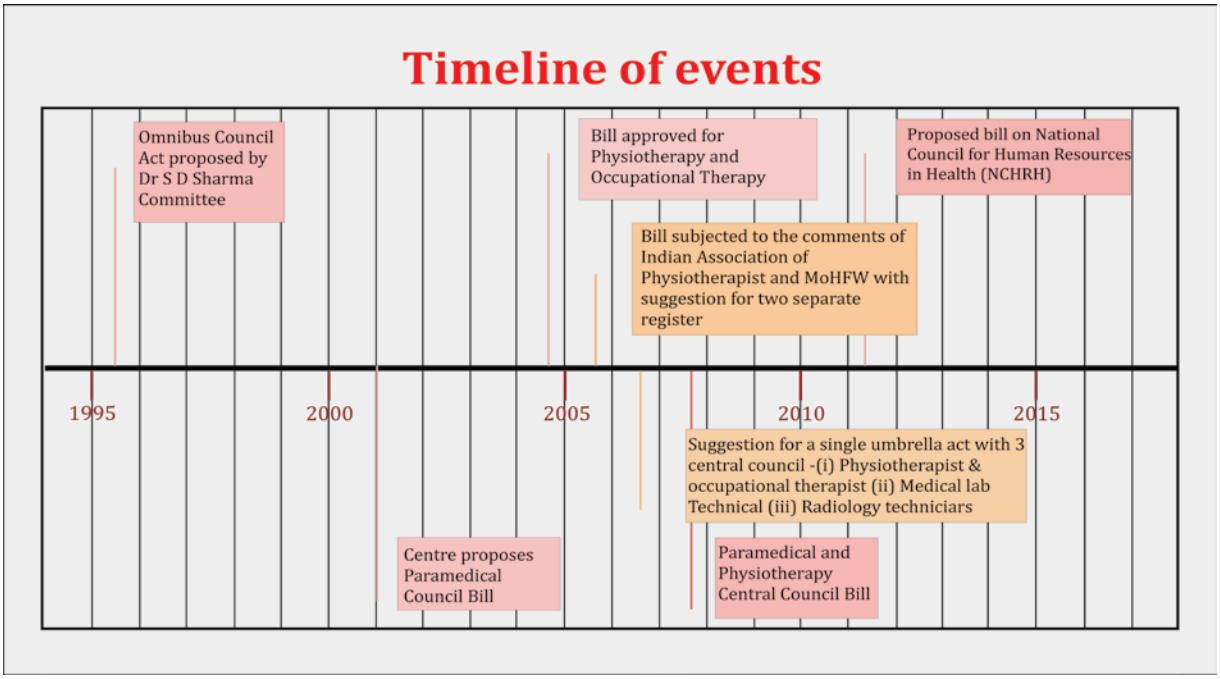
- Lack of standardised entry-level qualifications and examination procedures
- Lack of national standards and benchmarks for accreditation and regulation of paramedical institutions
- No certifying authority for paramedical courses
- No grievance mechanism at the central level to address issues
- Lack of uniformity and enforcement of ethical standards
- Lack of a regulatory mechanism for skills assessment in cases of upgradation of personnel.

c) Regulation of AHPs at state levels

At present, the RCI regulates training programmes and training institutes in the rehabilitation and disability sector. The Paramedical Council and Specialty Council under state governments exist in certain states such as Maharashtra, Madhya Pradesh, New Delhi, Kerala,

Karnataka, Himachal Pradesh and Andhra Pradesh. Currently, registration is almost guaranteed if the education (certificate/diploma/degree) undergone is 'recognised' by a university recognised by the University Grants Commission (UGC) or any other similar regulatory body.

Figure 3: Chronology of events for the proposed Paramedical Bill



BOX 2 The Proposed Paramedical and Physiotherapy Central Councils Bill, 2007

This Bill has not been approved yet. The highlights of the Bill are as follows:

- The Paramedical and Physiotherapy Central Councils Bill, 2007 seeks to set up three councils to regulate physiotherapists and occupational therapists, medical laboratory technicians and radiology technicians.
- Each central council shall set minimum educational standards for the profession it regulates and maintain a register of qualified practitioners. It can specify standards of professional conduct for each profession and take disciplinary action, including the removal of a person's name from the register, against any practitioner found to be guilty of violating such standards.
- Every university or institution offering educational courses in the relevant subjects has to seek the prior approval of the Central Government.
- Every person practicing under the Act has to be registered with the respective council.
- Clinical establishments can appoint only those physiotherapists, occupational therapists or paramedics who are registered with the respective council.
- Any person whose name has not been entered or whose name is not deemed to have been entered in the register of the Central Council under this Act and is practising as a paramedic or physiotherapist, as the case may be, shall be punishable with imprisonment for a term which may extend up to six months, or with fine which may extend to twenty thousand rupees, or with both.

BOX 2 The Proposed Paramedical and Physiotherapy Central Councils Bill, 2007

The Bill further states:

- 'Paramedic' means a person whose name has been entered in the registers of the Paramedical (Medical Laboratory Technology) Central Council and Paramedical (Radiology Technology) Central Council.
- Paramedical' means the medical laboratory technology and the radiology technology.
- The Bill defines occupational therapy and physiotherapy as 'medically directed' therapies, which implies that patients may not be able to approach professionals in either of these fields without a reference from a doctor.

Commonalities within the state councils

In the Indian context, few states have framed legislation to govern the paramedical profession.

- These provisions primarily intend to regulate education and prescribe standards thereof. There are no licensing exams or skills upgradation/ renewal system.
- It is seen that all the state councils are supported by acts passed by the state legislative assembly with partially autonomous authority.
- The final authority remains vested with the respective state governments. The tenure of authority is 5 years in the states of Madhya Pradesh and Maharashtra while it is 3 years in the states of Himachal Pradesh and Kerala.
- None of the state councils have any political standing.
- All the present paramedical acts have a similar structure with provision of registration and licensing along with renewal of the same. The provisions to deal with malpractices along with other punishment provisions are similar. Only the state of Kerala has the exclusive provision of mandatory employment of licensed paramedics in healthcare institutions. The Act in Kerala mandates healthcare facilities to employ trained professionals.
- The standards mentioned with regard to training and curriculums are general in all the states with provisions of UG, certificate, diploma and PG courses available.
- There is also the provision for university affiliation with the council on fulfilling certain set criteria. The education and training of trainees falls under the control of the state council.
- However there is no provision of regular audits conducted in the institutes affiliated. Instead the audits conducted are done by the designated Charted Accountant (CA) as and when required.
- All the councils have similar punitive powers with the appellative authority vested with the state government.

The present councils in India were analysed using a comparative tool on the following ten parameters:-

i. Legislative backup supporting the council
ii. The controlling authority
iii. Tenure of the authority
iv. Any political affiliation
v. Key provisions in the document
vi. Training and curriculum
vii. Restrictive provisions
viii. Promotive provision
ix. Disciplinary provision
x. Appellative provision

The findings of the comparative analysis elucidate differences in regulatory bodies across states as depicted in the table below: The details of few of the "State Paramedical Acts" are enumerated in appendix-3.

Table 1: Comparative analysis of regulatory framework for states

S. No.	Parameters	Details	Madhya Pradesh	Himachal Pradesh	Kerala	Andhra Pradesh	Maharashtra
1	Backbone	Statute/ Act	Statute	Statute	Statute	Act	
		Ordinance					
		Pending Bill					
		Add on to existing Act/Bill or Ordinance					
2	Controlling authority	Fully autonomous					
		Partially autonomous		Y	Y		Y
		Government control+ people partnership					
		Fully controlled by Government					
3	Tenure Of authority	2 years					
		3 years		Y	Y		
		4 years					
		5 years or more	Y				Y
4	Inclusion of any political member	Y/N	N	N	N		N
5	Key provisions	Provision for registration and licensing (Y/N)	Y	Y	Y	Y	Y
		If yes, what is the renewal procedure?	Y	Y	Y	Y	Y
		Provision of independent practice(Y/N)					
		If yes, what trades?					
		Provisions to deal with malpractice	Y	Y	Y	Y	Y
		Other punishment provisions present	Y	Y			
		Mandatory employment of licensed paramedic in Health Care facility	N	N	Y		N

S. No.	Parameters	Details	Madhya Pradesh	Himachal Pradesh	Kerala	Andhra Pradesh	Maharashtra
6	Training and curriculum	Are standards, subject-specific or general		General	General		General
		Is there an infrastructure prescribed?	Y	Y	Y		
		Is there a standard student–trainer ratio prescribed?	Y	N	N		N
		Quality Reasoning (QR) for faculty prescribed	Y				
		Provision for certificate/ diploma/ degree/ PG	Y	Y	Y		Y
		Provision for university affiliation	Y	Y	Y		Y
		Exclusion list of courses provided(Y/N)	N	N			
7	Restrictive provision	Are these provisions for regular audit?	N	N	N	Y	N
		If yes, inspection and audit mechanism defined or not?	Y	Y	N	Y	Y
		If yes, is it regular/ periodic or need based/ for start-ups only?		Regular	As required	Periodic	Periodic
		Restriction for disabled, etc.	N	N	N	N	N
		Any gender-specific restrictions	N	N	N	N	N
		Age-specific restriction	N	N	N	N	N
		Maximum students v/s infrastructure restrictions		N	N	N	N
8	Promotive	Provision of inclusion of new disciplines	Y	Y	Y		Y
		Provision for research	Y				
9	Disciplinary role	Does the authority have only watch dog role?					
		Does it have punitive powers?	Y	Y	Y		Y
		Is process clearly defined?	Y	Y	Y		Y
10	Appellative role	Is there an authority defined?	State govt.	State govt.	State govt.		
		Is appeal procedure clearly defined?	Y	Y	Y		
		Are matters for appeal clearly defined?	Y	Y	Y		

3. Global context of regulation

A close scrutiny of regulatory frameworks applied internationally indicates consistent patterns emerging from developed and developing countries to regulate AHPs. The regulatory process evolves from standardising training and skills development to controlling individual practice. Globally, there are successful models with and without overarching regulators in the healthcare arena. This section aims to review international regulatory best practises, which range from over-regulation in the United Kingdom to self-regulation as seen in Australia.

Courses are usually recognised by a university, government department, technical council or an AHP council with legislative backing, while education institutions are regulated by a different body. It is seen that in developing countries, the emphasis is on regulating the standards of training and education.

In developed nations, there is more emphasis on monitoring the possession of appropriate skills required for professions; the focus is on regulating the profession by continuous monitoring of skills and performance through a license renewal mechanism. This, basically, includes principles of on-going competence and separation of the registration process from the disciplinary process. It is seen that having one legislative framework allows consistent procedures and terminologies across the professions.

Regulation of the allied health profession in the United States is mainly consumer driven and its main concern is ensuring consumer safety. It is based on a stringent licensing system and individuals have to pass tests and obtain scores to satisfy the standards. The boards also specify training standards, pre-licensing training and skill needs. Hence, training is indirectly regulated. The focus is on monitoring the quality of education with a view to ensure that professionals, after undergoing the curriculum, would be in possession of the necessary skills and attitude to render services to the community with a minimum risk of harm. In this system, the aspects of continuous upgradation and aspiration are neglected.

Training parameters for every allied health profession are prescribed but training institutions for these are governed by the education department of the country. This system clearly demarcates the areas of jurisdiction and hence helps in avoiding a clash of authorities by providing clear roles and responsibilities to the various stakeholders. This drastically reduces overburdening of the regulatory bodies, which already have the onerous task of standardisation, compliance monitoring, etc.

The literature review across countries is summarised in table 2.

4. Governance and regulation in allied health system

A literature review of regulatory practices in developing countries has indicated an emphasis on regulating the standards of training and education. Mostly, registration is guaranteed if a degree/certificate is obtained from 'recognised' institution. The authorities have the power to de-register the institutions and/or the professional in case of malpractice. There is not much emphasis on skills mapping, skills upgradation and registration renewal systems. The legislation and subsequent regulation meet the purpose of dissuading untrained people and quacks to some extent.

In developed countries, there is an over arching 'super regulator' over different councils which are separately responsible for their specific allied health professions.

Training parameters for every allied health profession is prescribed but training institutions for these are governed by the education department of the country. This system clearly demarcates the areas of jurisdiction from each other and hence helps in avoiding a clash of the authorities and defines clear roles and responsibilities of the various stakeholders. This drastically reduces overburdening of the regulatory bodies, which already have the tasks of standardisation, compliance monitoring,

etc. Possession of a degree/certificate may be a pre-requisite but it does not guarantee licensing. Skill and competence levels are mapped on a regular basis. The conduct and behaviour of the professional is taken seriously and attracts penalty. The cost element involved in the licensing system needs to be weighed in perspective with the merits of imposing restrictions for entering a profession and the urgent need to make human resources with minimum skills available at minimal cost.

a) Regulating the profession

In developed countries the focus is more on regulating the profession by continuous monitoring of skills and performance through a license renewal mechanism. In addition, conduct and ethical issues are addressed through disciplinary institutions integrated into the system.

Regulation of professions comprises two parts

- Accrediting the institutions (measuring them against benchmarks)
- Accrediting the programmes

While the former is to guide students in selecting a legitimate institution (which complies with the accepted standards of inputs and resources), the latter seeks to identify courses within the institution which are measured against benchmarks. The third part of regulation is certifying/licensing the practitioners of the occupation. The final part of regulation addresses the needs for practice of a vocation.

However, in developing countries, the focus is more on monitoring the quality of education, with a view to ensuring that professionals, after undergoing curriculum training and successfully passing the exams towards award of a certificate/diploma/degree, would be in possession of the necessary skills and attitudes to render services to the community with minimum risk of harm. In this system, the elements of continuous up gradation and aspiration get neglected. However, there is a cost element involved in the licensing system. In a developing economy, one has to weigh the merits of over-restriction in the profession with that of making available an abundant supply of professionals with the minimum required skills at the least cost. Regulation of professionals by peer-review mechanisms is also common in the West.

b) Regulating education

Although education represents a fundamental element for building workforce capacity, due to regulatory (e.g. accreditation) and logistical (e.g. faculty shortages) issues, academic healthcentres and other institutions struggle to produce sufficient graduates to meet the nation's rising demand or need for health professionals, especially for allied health. In exploring the complexities of the regulatory, educational and practice environments, the need for a structural framework and an initiative at the national level cannot be overstated. Much needs to be done at the national and sub-national levels.

i. Indian context

The National Health Policy (NHP) 2002 recognises the need for the establishment of statutory professional councils for paramedical disciplines to register practitioners, maintain standards of training and monitor performance.

- Universities are governed under the UGC Act, 1956 for post school-level education.
- Universities give credence to qualifications from the graduate level onwards.
- The All India Council for Technical Education(AICTE) has approved a number of courses in the allied health professions.
- There is no central council for recognising allied health courses under the Ministry of Health.

ii. Stakeholders

- State-run institutions
- Private institutions
- National Open School
- Indira Gandhi National Open University (IGNOU)
- Private medical colleges running selective courses
- Private/corporate hospital
- Military and paramilitary forces that have their own institutions.

c) Governance of universities

Irrespective of the establishment of the university under any legislation, central or state, each university is intended to function as an autonomous institution, with the freedom to organise and administer itself as a corporate body in accordance with the law by which it is established. The Act under which it is established determines the nature and extent of its autonomy.

There are two major components in the management of universities:

i. Functions and processes associated with administration of the institution, such as personnel management, finance and infrastructure

ii. Academic management: teaching–learning functions and their processes, such as curriculum design, instructional system, teaching and student assessment.

These two functions determine the governance of the universities. Every university has two decision-making bodies. The Executive Council (Board of Management

or Syndicate) deals with the first component mentioned above, and the Academic Council (Senate) takes all decisions pertaining to the academic management of the system. Both the councils are expected to work with mutual respect and in coordination for better administration and management.

The important functions of the Executive Council are as follows:

i. Making statutes and ordinances that govern the system
ii. Controlling finances and properties
iii. Managing personnel
iv. Supervising the management of institutions affiliated to the university
v. Grievance redressal

The Academic Council undertakes the functions of:

i. Laying down the academic policies of the university
ii. Supervising the academic policies and providing direction on the method of instruction, evaluation of research and improvement in academic standards
iii. Interfaculty coordination for joint programmes and projects
iv. Recommending statutes and ordinances in matters pertaining to academics.

d) Other models of governance

It was also seen that there are professional universities of national importance which have a different pattern of governance within the system, such as the Indian Institutes of Technology(IITs). The Board of Governors is responsible for the general superintendence, direction and control of the affairs of each of the IITs. It is constituted by the following members:

i. The Chairman Director Ex-officio
ii. One person representing each of the states comprising the zone in which the institute is situated, from among the reputed industrialists or technologists within the system
iii. Four persons having special knowledge or practical experience in engineering or science education to be nominated by the Council
iv. Two professors of the institute, to be nominated by the Senate.

Unlike universities, the Board does not have any representation from political parties and bureaucrats. Many innovative approaches have been taken in institutes such as the IITs. These include creation of posts of functional deans, such as for academic affairs, research and development, student affairs, among others. These have enabled these institutes to manage the disciplines more effectively and comprehensively.

5. Policy issues for consideration

i. Entry-to-practice requirements should be standardised and limited to competence assessments for health professions to facilitate the physical and professional mobility of the health professions.
ii. Minimum standards should be adapted for affiliation, institutional requirements, application formats, evaluation procedures, and appellate and adjudication procedures.
iii. Practice acts should be based on demonstrated initial and continuing competence. This process must allow and expect different professions to share overlapping scopes of practice. Pathways should be explored to allow all professionals to provide services to the full extent of their current knowledge, training, experience and skills.
iv. Health professional boards should be redesigned and their functions should reflect the interdisciplinary and public accountability demands of the changing healthcare delivery system.

v. A framework should be created for quality assurance and continuous improvement.

vi. Boards should educate consumers to assist them in obtaining the information necessary to make decisions about practitioners and to improve the board's public accountability.

vii. Boards should cooperate with other public and private organisations in collecting data on regulated health professions to support effective workforce planning.

viii. Standardised and understandable language should be used for regulation of health professions and their functions. These should be clearly described for consumers, provider organisations, businesses, and the professions.

6. Recommendations

Currently, due to the absence of a central regulatory authority for AHPs and courses, smaller voluntary associations have been created at the state and national levels to fill the void of a regulatory body. For instance, the rules or norms of professional practice vary from extremely professional and well-organised groups such as physiotherapists, optometrists, speech and audiology professionals to diffuse groups such as operating room technicians and radiation therapists.

For the allied health cadre to grow in the healthcare system, these professional associations need to be bound by a common authority that will help AHPs to flourish as a family rather than different classes within the community of the healthcare system. The role of regulating both the profession and the professionals cannot be an optional path but rather a condition for participation in the profession.

Presently, AHP education is fragmented, with small institutions at one end and a systematic education system in large medical institutions at the other. In the absence of regulatory mechanisms to control these categories, the mushrooming of these training institutes has continued unabated and has the potential to cause more damage to the clientele of the medical profession. Lack of standards for courses and institutions has led to an erosion of quality which does not match the required industry standards. A drastic regulation imposed suddenly may be counterproductive, raise resistance and cause legal complications. Hence, there is a need to start with a graded approach.

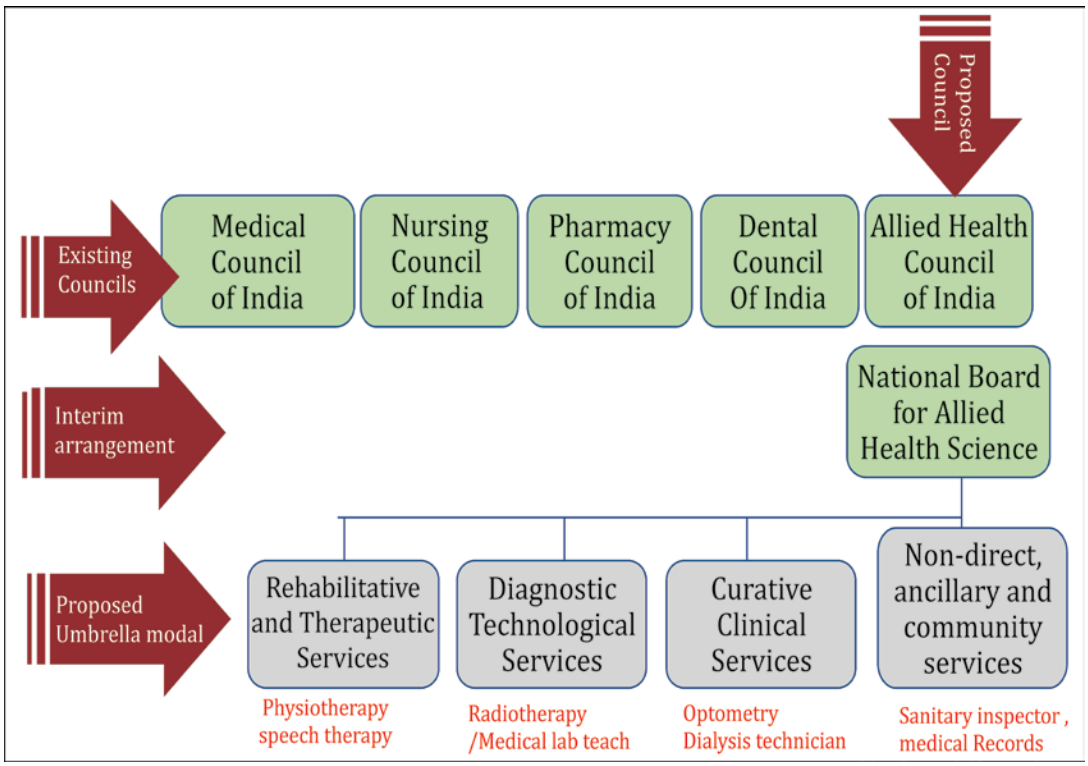
Recommendation 1

Setting up a National Board for Allied Health Sciences (NBAHS) - An interim arrangement for the setting up of a National Board for Allied Health Sciences is recommended, which can eventually merge into an overarching council.

It is recommended that the umbrella model may be adopted for regulation of allied health sciences. Although the National Commission for Human Resources for Health Bill, 2011[7] has been currently withdrawn from parliament, the bill provides a good starting point from which an allied health council framework may be derived. Realising that a parliamentary approval to moving this critical agenda may be rather a long drawn process with uncertain outcomes we have recommended an interim board structure that may be put into effect through an executive order, if deemed appropriate and therefore fast track the progress.

This system will function as the umbrella structure

Figure 4: Proposed allied health regulatory structure



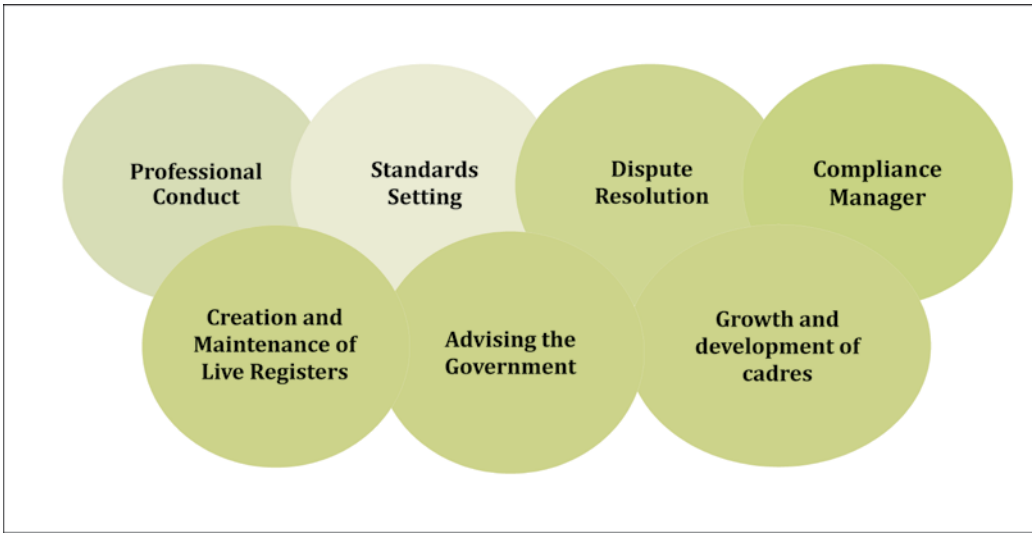
where every aspiring cadre will be represented through its professional committee along with the existing allied health professions councils under the allied health umbrella.

Some key issues for consideration for the establishment of the NBAHS

- The NBAHS may be setup as a corporate body.
- It should be formed as per the functions envisioned for the National Board for Health Education (NBHE) and National Evaluation and Assessment Committee (NEAC), as per the National Commission for Human Resources for Health Bill with respect to allied health sciences only.
- The board can function from institutional premises immediately with minimum staff.

The functioning of the board is independent of the establishment of the NIAHS.

Figure 5: Functions of national board for allied health sciences (NBAHS)



Key functions of the NBAHS

- **Professional conduct**

The Board will specify and enforce the standards of professional conduct and etiquette to be observed by professionals for each cadre and take disciplinary action, including the removal of a person's name from the register, against any practitioner found to be guilty of violating such standards. It will also communicate the expected professional standards to professionals.

- **Creation and maintenance of live registers**

A significant function of the board will be to maintain and publish registers of health professionals across the various cadres of allied health who meet the standards set by the Board. The Board will enrol persons with recognised qualifications on payment of a prescribed fee and fulfilment of other criteria or conditions as may be specified by the National Council, for a specified period. Only after enrolment will the person be considered fit to practise in the respective discipline of allied health.

- **Standards-setting**

The Board will take measures to determine, maintain and coordinate the minimum standards of and promote human resources in discipline of health education and training.

- **Advising the government**

The Board will advise government bodies or the appropriate statutory regulatory authority on any policy matter concerning evaluation and assessment. The Board will be responsible for the formulation of the financial plan required for the creation of human resources and subsequently make recommendations on the measures to strengthen healthcare delivery, operational efficiency and healthcare infrastructure.

- **Ethics and compliance manager**

The Board will house the ethical function overseeing research applications related to human subjects and the compliance thereof. It will lay down and communicate the code of conduct to be observed by the personnel in each cadre. The Board will have the responsibility to set up inquiries into such matters related to ethical compliance.

- **Dispute resolution**

The Board will function as an interim authority to handle all kinds of disputes between national-regional-level institutes.

- **Growth and development of cadres**

The Board will also facilitate coordination among bodies or national councils constituted under this Act, conduct social audit and obtain public feedback on their performance and achievements. It will grant permission for the establishment of health educational institutes, and ensure compliance of its terms and conditions or withdraw such permission. It will carry out studies and collect data required to assess the needs and requirements of human resources for health of training facilities in different states and Union territories (including the number, type and geographical location), and formulate the action plan for development of human resources, through the institutions/committees/bodies under its jurisdiction. It will promote and regulate inter-professional cooperation among health professions. It will coordinate the existing healthcare infrastructure in Central and State Governments for effective utilisation thereof.

Composition of the governing board

i. The chairperson of the governing board (NBAHS) will be appointed by the Central Government and should be a person of eminence, integrity and outstanding calibre with a postgraduate degree in the discipline of health, health policy, public health, management, technology, law or finance from a recognised university or institution, with at least 20 years of experience in the respective field. The chairperson's position should not be an ex-officio position.

ii. The member secretary would be ex-officio director of the NBAHS.

iii. Other members:

- Ex officio: Secretary Ministry of Human Resource Development or nominee, Joint Secretary in charge, MoHFW, Financial Advisor, MoHFW, Director General, Armed Forces Medical Services (DGAFMS), Advisor, Planning Commission
- Ex officio: Directors of NIAHS and RIAHS; Directors, All India Institute of Medical Sciences (AIIMS), New Delhi and Post Graduate Institute of Medical Education and Research (PGIMER); President, NBE; Director, Indian Council for Medical Research (ICMR);Director, Institute of Applied Management and Research (IAMR).
- Representatives from UGC, AICTE, IGNOU
- Members from professional associations and councils and state paramedical councils
- Nominated members:
  - Persons of eminence representing the industry, namely, health service providers ororiginal equipment manufacturers (OEM)
  - Persons of eminence with experience in the field of health administration, modern medicine or public health.

Recommendation 2

The National Board for Allied Health Sciences will consist of the National Allied Health Education Committee (NAHEC) and National Allied Health Evaluation and Assessment Committee (NAHEAC).

Figure 6: Illustrative structure of the National Board for Allied Health Sciences (NBAHS)

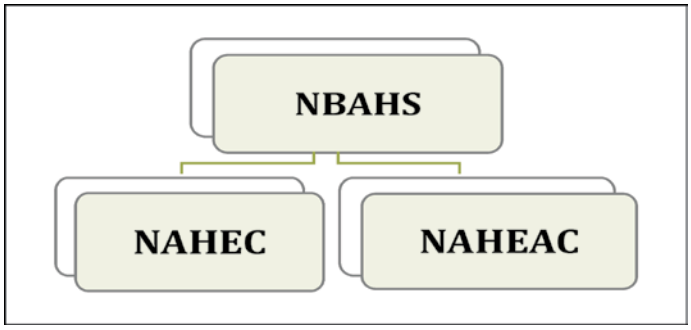


Figure 7: Functions of the committees under the board

National Allied Health Education Committee (NAHEC)
• Academic functions • Affiliation related • Advisory role to the National Commission for Human Resources for Health • Coordinating role • Publish journals, memoirs, transactions and other publications
National Allied Health Evaluation and Assessment Committee (NAHEAC)
• Standard setting for evaluation and assessment • Quality assurance • Certification of courses • Accreditation and certifying institutions • Other functions

Composition of the NBAHS

The functions of each component, namely, NAHEC and NAHEAC, have been drawn on the lines of the NCHRH Bill.

Functions of the NAHEC[8]

- Academic functions Develop coordinate and maintain standards for health education and research.
- Develop minimum standards of infrastructure, faculty, training requirement and workload norms for individuals, and clinical workload for the establishment of institutions in the discipline of health.

- Design and approve new courses of study as recommended by institutes, hospitals, colleges or universities for imparting allied health training and conducting courses for these.
- Lead the curriculum development for various courses.
- Organise seminars, trainings or conferences for continuous medical education and such other courses, workshops or programmes as may be specified by regulations made by the Commission.
- Undertake standards for faculty development programmes.
- Specify schedules of admissions to various courses of study.
- Specify calendars of examinations and scheme of examinations.
- Establish and implement the examination/ assessment process for entry to any undergraduate, postgraduate, doctoral, post-doctoral, super-specialty or diploma courses, fellowship examination and screening test (protocols for certification mentioned in appendix-3 of chapter-1.
- Take such steps as may be desirable to improve the standards of training and development of quality health professionals.
- Foster research in various aspects of allied health sciences.
- Specify parameters for equivalence between academic qualifications granted by different health institutions in the discipline of allied health sciences, whether in India or abroad.

i. Affiliation related

- Provide a framework for affiliation: minimum standards for affiliation, institutional requirements, application formats, evaluation procedures, appellate and adjudication procedures.
- Provide affiliation (recognition) to various allied health science courses.

ii. Advisory role to the National Commission for Human Resources for Health

- Advice the Allied Health Sciences Central Cell in the Ministry.
- Advise the Commission on establishment of laboratories, institutes and training centres for continuous medical education in the allied health sciences.

iii. Coordinating role

- Coordinate with institutes, universities and bodies at the international level for discharge of its functions.
- Coordinate between allied health scientific academies, societies, professional associations,various allied health councils, institutions and government departments and services.
- Promote and maintain a liaison between MCI, INC, DCI and PCI.

iv. Publish journals, memoirs, transactions and other publications

Functions of the NAHEAC

i. **Standard-setting for evaluation and assessment**

- Specify standards, norms and processes for registration of evaluation and assessment agencies.
- Undertake audit for adherence to the code of ethics, including policies on obviating conflicts of interest, disclosure of information, evolving transparency in processes and procedures of evaluation and assessment.
- Develop methodologies of evaluation and assessment in collaboration with other agencies such as the NBE.
- Promote research and innovation in evaluation and assessment.

- Scrutinise the report of the evaluation and assessment agency on the applications for consideration of grant of permission for establishing of a college, institute or university and make its recommendations to the Commission

ii. Quality assurance

- Create a framework for quality assurance and continuous improvement.
- Recognise and encourage merit in all branches of allied health sciences and technology.
- Recommend improvement in academic quality.
- Lay down policies for providing information to the public with regard to all aspects of quality and performance of institutions providing health education and programmes conducted by them.
- Specify and monitor standards for the selection and training of experts for the purposes of evaluation and assessment.

iii. Certification of courses

- Conduct skills certification through NBE-like protocols.

iv. Accreditation and certifying institutions

- Lead a consortium of accrediting /regulatory agencies which would certify skills while the formal council is under development.
- Approve and notify norms and standards of maintenance of academic quality for accreditation and benchmarking of education in recognised health educational institutions imparting approved courses in the discipline of health throughout the period of accreditation.
- Develop guidelines for accreditation and accrediting institutions.
- Monitor adherence to such norms, guidelines and standards of academic quality, as may be specified under any law for the time being in force by the appropriate statutory regulatory authority, in health educational institutions.
- Collect, compile and disseminate information regarding accreditation of health institutions and programmes conducted by them to the public.

v. Perform such other functions as may be assigned to it by the Commission.

Recommendation 3

Certification of allied health courses maybe performed by the National Board of Examinations, until a similar structure is established under the NAHEC and accreditation of institutes conducting such courses may be ordained to be performed by the National Accreditation Bureau of Technical Education (NABET) under the Quality Council of India (QCI).

Quality should be in built right from the beginning. It should be incorporated into all the aspects starting with the infrastructure, teaching, course curriculum, methodology, course delivery, training institutions, faculty, assessments, examinations, internships, mentoring and all other aspects, including governance.

Regular student performance, and teacher-student feedback are very good ways of quality improvement and should be instituted in all institutions. A number of partnerships will need to be established to achieve quality across all programmes and institutions. International partnerships will also need to be established. A robust public–private partnership (PPP) model will go a long way in ensuring quality. Research is a very important aspect for establishing quality in allied health sciences. Funding for research will have to be earmarked.

Institutions can be accredited by the National Accreditation Board for Education and Training (NABET) in line with international standards and guidelines. It functions under the Quality Council of India (QCI) and has developed guidelines. Some of the quality interventions include auditing of academic training evaluation records at regular intervals by internal and external auditors through the scrutiny of attendance registers, teaching hours, unit planning,

evaluation of internal assessments carried out, and equipment maintenance.

NABET will be responsible for performing the following functions:

i. Define criteria for accreditation of institutions for training in terms of the human resources, patient load (inpatient beds, outpatient department, surgical and clinical procedures, investigations, etc.), infrastructure and facilities, library, teaching facilities, hostel facilities, etc.

ii. Specify the application format and guidelines for institutions desirous of running courses, including accreditation fees, etc.

iii. Specify criteria for identification of inspectors and inspection format for inspectors.

iv. Set guidelines for the accreditation process such as criteria for selection of members of the accreditation committee, functional aspects, notification, etc.

v. Establish mechanisms for periodic inspection to ensure standards of training.

NBE, under the Board, can continue to conduct all the courses in addition to new courses. It will be responsible for conducting postgraduate examinations for every allied health cadre. It will oversee the manner of conducting examinations for entry to graduate, postgraduate, doctoral, post-doctoral, super-specialty or diploma courses and fellowship examinations by the Board. It will provide common standards and mechanisms of evaluation for the minimum level of education required in the various allied health educational streams and overall profession. Moreover, intra-country and international comparison is facilitated with the availability of a commonly accepted evaluation mechanism.

Issues to be considered while designing the regulatory framework:

i. Standardised and understandable language should be used for regulation of health professions and their functions to clearly describe them to consumers, provider organisations, businesses, and the professions.

ii. Entry-to-practice requirements should be standardised and limited to competence assessments of health professionals to facilitate the physical and professional mobility of health professionals.

iii. Practice acts should be based on demonstrated initial and continuing competence. This process must allow and expect different professions to share overlapping scopes of practice. Pathways should be explored to allow all professionals to provide services to the full extent of their current knowledge, training, experience and skills.

iv. Health professional boards should be redesigned and their functions must reflect the interdisciplinary and public accountability demands of the changing healthcare delivery system.

v. Boards should educate consumers to assist them in obtaining the information necessary to make decisions about practitioners and to improve the board's public accountability.

vi. Boards should cooperate with other public and private organisations in collecting data on regulated health professionals to support effective workforce planning.

7. Conclusion

The primary role of a government should be to protect patients' welfare by instituting regulations and rigorously monitoring their enforcement. However, drawing up laws in a sector such as health can be complex. The objective of regulations must therefore be to increase awareness and create a sense of accountability among providers regarding the quality of patient care, and not a routine application of a standard or a rule. Thus, supervision needs to be supportive, and not prescriptive or fault-finding, as the objective must not be to drive away providers but to persuade them, through the judicious use of carrots and sticks, of the need to adhere to quality and ensure patient safety. Since health is a State subject with the Centre having concurrent jurisdiction in only a few areas, states have the liberty to legislate their own laws. Given the wide variation across states, it is necessary to undertake a comprehensive assessment of the adequacy or otherwise of the existing laws, identify gaps and come up with a package of public health laws.

Regulations will need to effectively address market failures that give rise to malpractices such as fee-splitting, overmedication and poor adherence to quality standards. They also need to ensure ethical practices, transparency and dissemination of information on prices and quality to consumers, impose requirements for licensing and accreditation of hospitals, protocols and prices.

Regulation is limited in what it can accomplish and is not a solution to the various problems. And when regulations remain unenforced, they count for little. It is therefore equally important to develop the capacity and social consent to enforce them. Enforcement is expensive, requiring extensive data collection, collation, analytical research and computerisation, and trained persons to inspect, verify, correct and monitor implementation of the contractual obligations. Likewise, micro-planning, restructuring of health provider markets, price-setting, etc. require patience, negotiating skills and dialogue with various provider associations. Thus, financial resources and making laws is only one part of the solution; having the required human skills and technical capacity to enforce them is another issue altogether that needs to be built up immediately. Without this capacity, institutionalising PPP is difficult to sustain.

The standards by which these programmes are measured have generally been developed by the professionals involved in each discipline and are intended to reflect what a person needs to know and be able to do to function successfully within that profession. Accreditation in the health-related disciplines also serves a very important public interest. Along with certification and licensure, accreditation is a tool intended to help assure a well-prepared and qualified workforce for providing healthcare services.

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*Please refer to Bibliography for additional references (attached at the end of the document).

Chapter 3

Estimating Imbalances in the Allied Health Workforce

Chapter 3

Estimating Imbalances in the Allied Health Workforce

1. Introduction

The task of addressing the shortage of human resources starts with identifying the current availability and quality of allied health personnel, and then maximizing training efforts to fill the gap. Allied health professionals (AHPs) are intrinsic to effective healthcare delivery, especially in developing countries which have a heavy disease burden and traditionally widespread shortage of human resources in the healthcare system.

As India's health sector undergoes major policy reforms during the 12th Five Year Plan (2012–2017), this time is ideal for comprehensive, targeted interventions to address the demand–supply mismatch that plagues the allied health system in the country. This chapter attempts to grasp the challenges in training and retention of AHPs while creating a conducive environment for encouraging more students to consider allied health as a career option.

A look at the official estimates of the numbers of the allied health workforce in India indicates the extent of the problem. The table below indicates the existing number and density (per 10,000 population) of the allied health workforce in the system as per the National Sample Survey Organisation (NSSO) and Census of India estimates.

Table 1: Number and density (per 10,000 population) of allied health professionals (AHPs)

Estimate	NSSO			Census		
Category	NCO Classification	Number (per 10000 population)	Density	NCO Classification	Number (per 10000 population)	Density
Dietician & nutritionist	Dietician & nutritionist	260	0.002	Dietician & nutritionist	3587	0.03
Optician & optometrist	Optician & optometrist	3539	0.03	Optometrist	13678	0.12
Medical assistant & technician	Medical assistant & technician	168159	1.51	Medical equipment operator	16240	0.15
				Medical assistant	99010	0.89
	Total	168159	1.51	Total	115250	1.03
Dental assistant	Dental assistant	10002	0.09	Dental assistant	2658	0.02
Physiotherapist	Physiotherapist			Physiotherapist	7265	0.07
				Modern health associate	15396	0.14
	Total			Total	22662	0.20
Other hospital staff	Other hospital staff	165753	1.49	Other hospital staff	NA	NA
All	All health workers	515872	5	All health workers	295746	3

Sources: National Sample Survey Organisation 2004–05; Census of India 2001

The national estimates mentioned above do not cover all allied health cadres as listed in Annexure 2 of Chapter 1. The present system lacks any live register/ record that covers the various AHPs. Hence, it was felt necessary to conduct a needs assessment of human resources based on the national requirement of the population rather than on the positions available.

The Public Health Foundation of India (PHFI), in partnership with General Electric (GE)'s Healthy Imagination group, aimed to assess the present situation of the allied health workforce along with the current gaps in the system. A detailed study addressing all the existing and emerging allied health cadres was therefore undertaken.

Objectives

The study had the following objectives:

a) To review the structure and functions of educational institutions in the country offering allied health courses

b) To evaluate allied health courses in terms of the number of professionals they produce per year

c) To calculate the number of degree, diploma and certificate holders graduating each year

d) To assess allied health courses in terms of educational methods and content

e) To compute the number of professionals needed at every level of the healthcare delivery system

f) To calculate imbalances in the number of AHPs and identify gaps/shortfalls among the following ten major categories at the national and state level:

   i. Ophthalmology

   ii. Rehabilitation

   iii. Surgery and intervention

   iv. Medical laboratory technology

   v. Radiography and imaging technology

   vi. Audiology and speech language pathology

   vii. Medical technology

   viii. Dental assistance technology

   ix. Surgery and anaesthesia

   x. Miscellaneous

Strategy

A multi-pronged strategy was used to quantify the national demand–supply gap. This consisted of the following:

a) **Data collection** from over 350 educational institutes in the country (using a questionnaire) to obtain details on parameters under the ambit of allied health such as the annual intake, course duration, ratio of theory and practical components and frequency of examinations, to name a few. (The questionnaire is given at Appendix 5 and the list of institutes is given at Appendix1). Figure 1 reflects a zone-wise distribution of institutions sampled for the study.

b) **Field visits** for a first-hand view of infrastructure and related aspects to the following twelve centres of excellence which generate all levels of the allied health workforce, and are benchmarked against international standards:

i. All India Institute of Physical Medicine and Rehabilitation (AIIPMR), Mumbai

ii. Amrita Institute of Medical Sciences (AIMS), Kochi

iii. Ali Yavar Jung National Institute for the Hearing Handicapped (AYJNIHH), Mumbai

iv. Christian Medical College (CMC), Vellore

v. Institute of Public Health and Hygiene (IPHH), New Delhi

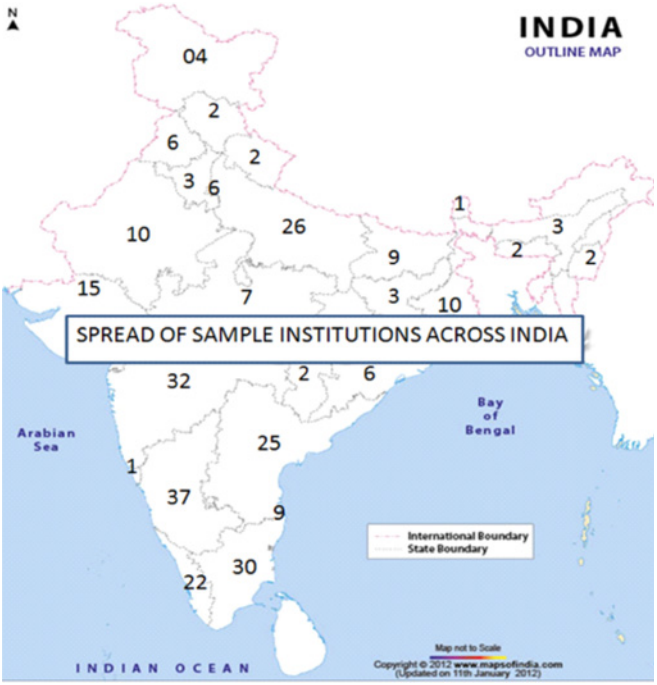
vi. Jamshedjee Jeejeebhoy (JJ) Hospital, Mumbai

vii. Ethicon Institute of Surgical Education (EISE), Johnson and Johnson(J&J), Delhi

viii. King Edward Memorial (KEM) Hospital, Mumbai

ix. Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh

Figure 1: Spread of sample institutions across India



x. Government Medical College (GMC), Chandigarh

xi. Safdarjung Hospital, New Delhi

xii. Sri Chitra Thirunal Institute of Medical Sciences & Technology (SCTIMST), Kerala.

c) **Focus group discussions** to gauge perspectives on the allied health situation in the country:

Two different groups were taken into consideration – students (currently pursuing the allied health course) and practicing professionals representing various allied health cadres.

Questions included their reason for joining the particular allied health specialty; perception of the demand of their course both nationally and globally; satisfaction with course modalities such as faculty, infrastructure, facilities, equipment and duration; perception on employment locations and salaries; and suggestions to improve their situation, to name a few.

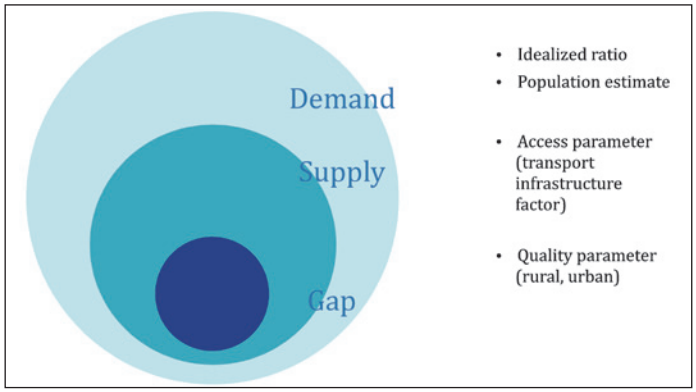
d) **Analysis of the shortfall** in the number of AHPs using all the data obtained:

To calculate the imbalance, an approach developed by Zurn *et al* was used, in which the supply of these professionals based on the current scenario was compared to the demand for these professionals based on targets set as per international health standards for developing countries.[1]

The analysis was based on data and information obtained from various published and unpublished sources. We reviewed the literature in the English language using PubMed, Google Scholar, Google Search and institutional and government websites such as World Health Organization (WHO), Ministry of Health and Family Welfare (MoHFW) and the US Department of Labor – Bureau of Labor Statistics. Sources for statistics on AHPs for calculation of the demand–supply imbalance are given in Annexure 1.

We focused our search on issues related to human resources for healthcare including shortage, imbalance, retention and optimal need for all specialization categories mentioned above. Grey literature included Ministry of Health reports,

Figure 2: Various parameters used for demand–supply analysis



health workforce planning documents and capacity data from training institutions.

Various parameters used for demand–supply analysis are given in Figure 2.

Adjustment for efficiency parameter

To account for differences in efficiency of care provided by qualified professionals, trained unqualified professionals and unqualified professionals, an efficiency adjustment factor (0.28) was used to adjust total numbers of both rural and urban professionals[2][3]. This number was based on the findings of a study that concluded that the likelihood of recovery among patients visiting private doctors was 3.6 times greater than that among patients visiting other types of doctors.[4]

Adjustment for access parameter

To account for differences in access, the number of accessible and total practitioners was calculated using the following formula[2]

$$A_m = (T_m)\ (1/G)^y$$

where A_m and T_m denote the accessible and total numbers of practitioners, respectively, in an area and G is the geographical size of the area in square km. The exponent 'y' captures the effect of geographical size on the number of accessible practitioners; its magnitude will be greater the poorer the state is of the transport facilities.

The exponent factor 'y' was modelled in our case using 'transport infrastructure factor'. Two parameters were used to estimate this: (i) road length per 100 sq km of area, and (ii) road length per 1 lakh of population. The above data were obtained from a report on basic road statistics of India.[5] The two numbers were then multiplied together and the resultant number was normalised on a scale of 0–1 (where 0 represents states having good infrastructure, e.g. Delhi, while 1 represents states having poor infrastructure, e.g. Jharkhand).

After obtaining the access and efficiency parameters, the unadjusted supply numbers were multiplied using, separately, the efficiency parameter and the access parameter. Thus, there were totally three estimates of supply numbers:

(i) Unadjusted estimates;

(ii) Efficiency-adjusted estimates; and

(iii) Access-adjusted estimates. For final comparison with demand numbers the following were selected:

(a) Unadjusted supply numbers

(b) Minimum among efficiency-adjusted and access-adjusted supply numbers.

Projection

Depending on data availability, a range of sources including Indian or international health standards set by the WHO or the US Bureau of Labor Statistics were used in the analysis.

An optimal demand number was obtained for each sub-category of the workforce. These demand numbers were obtained through various sources in the literature and government reports. In several cases, numbers were estimated based on the US Bureau of Labor Statistics numbers.

Shortfall

The final shortfall numbers were calculated based on two methods:

(a) *Unadjusted estimates:* In this method, the supply numbers were directly subtracted from demand numbers to estimate the shortfall.

(b) *Adjusted estimates:* In this method, the supply numbers were adjusted based on efficiency and difficulty of access parameters. The adjusted supply number was then subtracted from the demand number to get the adjusted shortfall.

These methodological steps were used to obtain shortfall across all states and union territories for all the specialization categories.

Assumptions and limitations in the study

- All the educational institutes contacted as part of the data collection activity were as per the list obtained from the website of the Medical Council of India (MCI). These were assumed to be running one allied health course or the other. However, it was found that a sizeable number of institutes did not conduct any allied health course.
- Inconsistent, inadequate, incorrect (due to misunderstood questions) responses, or absence of responses to some variables, led to an inconsistent sample size.
- Logistic constraints and unwillingness of some institutes to share information
- Availability of supply and demand data for various categories of specialization was unavailable by state, and best available estimates from other states or countries were used.
- The number of workers retiring from the workforce was not included in the analysis.
- This analysis estimated a cross-sectional scenario of the gaps. The longitudinal scenario incorporating projections of population growth and mortality are not included in the analysis.
- Results for states/union territories with large urban areas may not reflect the actual distribution of the allied workforce, as the results depend on the percentage of community health centres (CHCs) + primary health centres (PHCs) + sub-urban centres present in the state. For example, states such as Delhi and Chandigarh have fewer numbers of CHCs and PHCs, so the current analysis shows a relatively fewer number of health workers present in large urban areas.
- For certain categories of workforce, the supply numbers were obtained using estimates of the number of students admitted in the colleges and the average number of years for which the college had been in existence. Data obtained as part of the supply analysis exercise indicated that the average age of a college offering courses to train the allied health workforce was 25 years. This number was then multiplied by the students getting admitted to the college to obtain the total such workforce present in India. A correction factor of 0.6 was applied on the calculated number based on comparison with actual data for some categories.
- To obtain the optimal number of the health workforce in certain categories, it was assumed that the ratio of the ideal number of the health workforce to the Indian population would be the same as the ratio of health workers to the US population as presented in the US Bureau of Labor Statistics.
- The current method of estimating the number of AHPs was based on a framework developed to measure the shortage of doctors.[2] It was assumed that the framework developed for physicians applied equally to AHPs.
- The supply numbers for various categories of the allied health workforce were obtained at the country level. Not much data was available on the

distribution of this work force at the state level. To obtain the distribution at state level, one of the key estimates used was percentage of female health workers at sub-centres and PHCs across different states as obtained from the report on 'rural health care system in India'.[6]

- An uneven distribution of the health workforce in rural and urban areas exists due to factors such as the distribution of health facility infrastructure, poor working and living conditions in rural areas and the concentration of income-earning opportunities in urban areas. A joint study done by the PHFI and the World Bank in 2008 indicates that across most health worker categories, typically 60% are present in urban areas. To account for this difference, rural and urban numbers were calculated separately. Demographic parameters such as total, rural and urban population numbers and percentage of rural and urban areas were obtained from the 2011 Census data.[6]

2. Research findings

The data obtained and the subsequent calculations made indicate a vast shortfall of AHPs. The data were analysed and the findings are presented in three major sections – supply, perception and demand.

Supply Estimates

This section identifies the present status of the entire allied health system in terms of infrastructure, courses and capacity of the allied health system with respect to seat capacity, futuristic courses and internship/ field training plans, to name a few. The Organisation for Health Management Research and Development (OHMRD) undertook a majority of the field visits and subsequent data collection on behalf of PHFI. The parameters taken into consideration for the detailed analysis are discussed below.

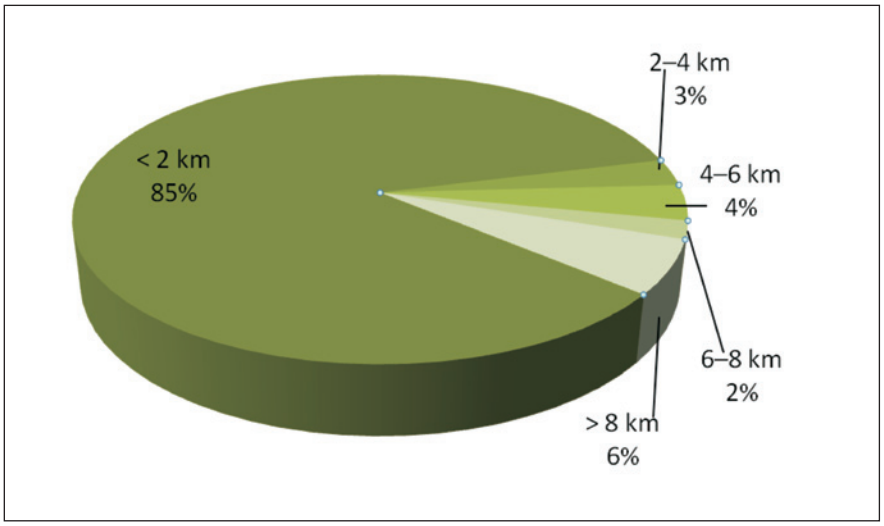
a) Institutions

i. Six states, namely Karnataka, Maharashtra, Tamil Nadu, Uttar Pradesh, Andhra Pradesh and Kerala contribute to more than 50% of the institutions spread across India.

ii. Of the institutions surveyed, 53% belong to the public sector, 30% are private and 17% are owned by charitable organisations.

iii. Although the majority of institutes are either less than 10 years old or more than 50 years old (together forming 58%), this is not an indicator of the duration for which the institutes have been conducting allied health courses.

Figure 3: Percentage of institutes affiliated or in proximity to a training facility (hospital)



iv. An overwhelming majority of institutes are in close proximity/affiliated to a teaching hospital (Figure 3).

v. Seventy-one per cent of the institutes do not have any separate infrastructure for allied health courses and yet have a large number of faculty members. The average number of faculty members per institute without exclusive infrastructure for allied health courses is 89 (which includes the medical faculty), compared to 48 for institutes with exclusive infrastructure

b) Allied health courses

i. Of the 134 courses offered by various institutes across the country, the top 10 most offered allied health courses (Figure 4) constitute 49% of the total number of students graduating each year. The other 124 courses are run by less than 10% of the institutes. The detailed list of courses being run by particular institutes is given in Appendix 6.

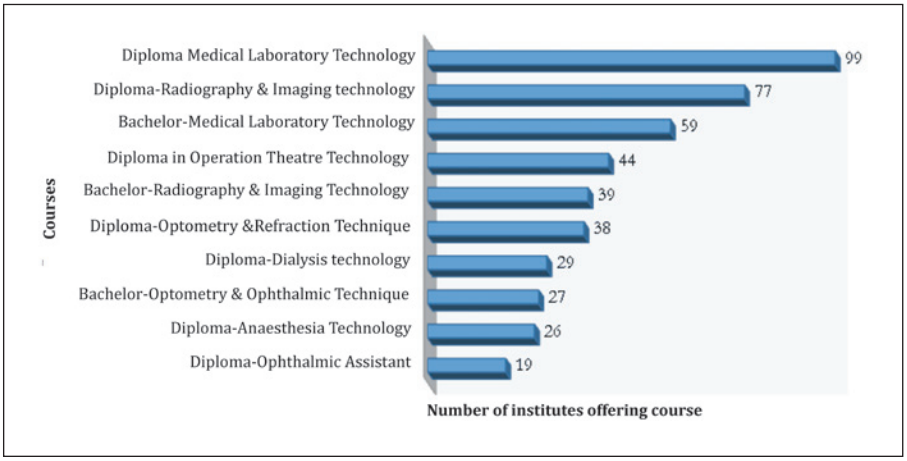
ii. The majority of sampled colleges were medical colleges as the list was obtained from the MCI. A few of the allied health colleges were also considered in the study as they were identified through the snowball technique in various regions. Of the complete list, 109 colleges had no allied health course running under their ambit. The list of courses pertaining to allied health streams that are not being conducted in any college includes Bachelor of Rehabilitation Therapy, postgraduate Diploma in Haematotechnology and Diploma in Neuro Electrophysiology , to name a few.

iii. Of the institutes surveyed, the most common level of educational qualification offered is a diploma. Educational qualifications higher than the postgraduate level such as PhD and MPhil are offered in courses such as Hearing and Speech Language Pathology, Optometry and Refraction Technique and Physiotherapy, to name a few. The complete list of the levels of educational qualification offered under various streams is given in Annexure 2.

iv. More than 50% of the allied health workforce produced annually graduate from only two courses, namely Diploma in Sanitary/ Health Inspector – 12,134 (39.30%) and Diploma in Medical Laboratory Technology – 3,789 (12.27%).

A complete list of all the AHS courses along with the numbers of the allied health workforce produced annually is given in Appendix 7.

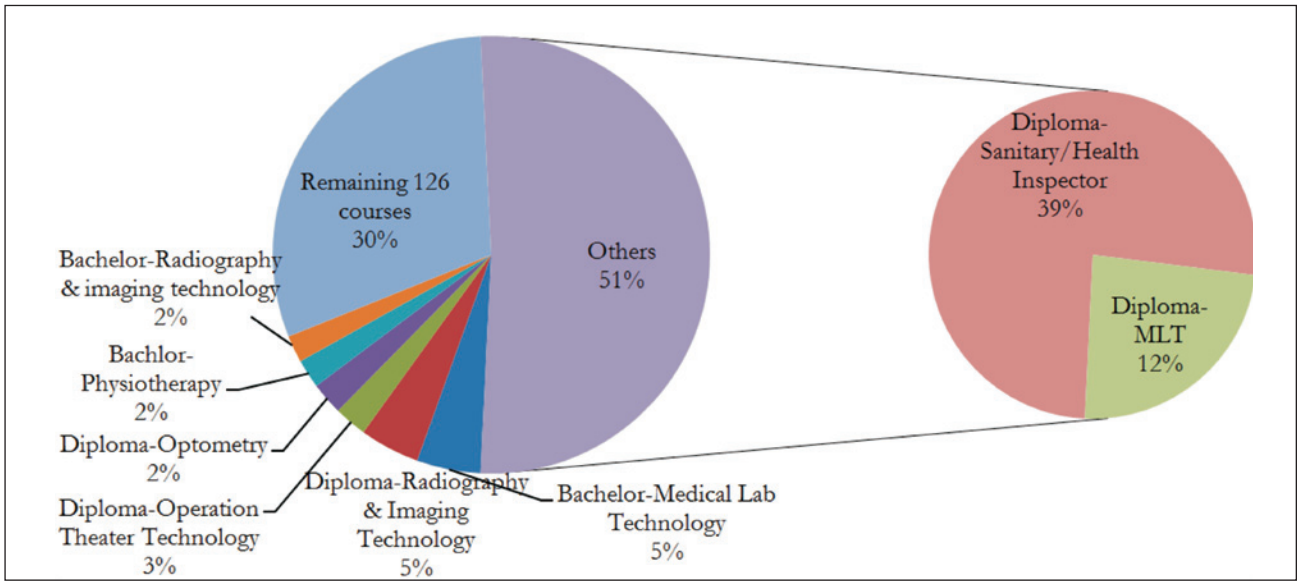
Figure 4: Top ten allied health courses offered by 351colleges sampled across India



BOX 1: High number of Sanitary Inspector graduates

It is pertinent to note that the Diploma in Sanitary Inspector is conducted by only five institutions. One of these five institutions conducts this course through its 26 branches across India, producing around 12,000 allied health workers annually. Figure 5 indicates the percentage distribution of workforce produced annually across all allied health streams.

Figure 5: Percentage distribution of annual intake under various allied health streams



v. Profiling of more than 900 institutions through a desktop literature review indicates the number of courses available for major disciplines at each level. The complete list of institutions is given in Appendix 2.

vi. Only two courses, namely Sanitary/Health Inspector and Medical Laboratory Technology (MLT) are offered at the apprentice level.

vii. Overall, the average ratio of theory to practical component for various allied health courses is around 59:41, though it differs from course to course. For example, some courses such as the Diploma in Optometry devote a balanced attention to theory and practical education (45:55), whereas this differs for the Bachelor of Optometry and Ophthalmic Technique course (71:29). Students have to submit a project report as one of the key requirements for 81% of courses. The details are given in Appendix 8. Field training, which is another essential component for skill development of the students, is absent in 62% of allied health courses. The complete list of courses with field training component is given in Appendix 9.

viii. The study indicates that the course fee is usually calculated on the following parameters:

- Cost per course in addition to operating cost of the institution
- Affiliation fees charged by the university for running courses
- Faculty-to-student ratio

BOX 2: Trends in teaching pattern

- At Ali Yavar Jang National Institute for the Hearing Handicapped (AYJNIHH), Mumbai, the practical sessions include 4–5 hours of clinical exposure on a daily basis right from the first year. Supervision by the supervisor is done through closed circuit television (CCTV) cameras.
- At Christian Medical College (CMC), Vellore the training is based on classroom teaching for about 3 hours a day and clinical training for about 6 hours per day. A weekly workshop list is developed which is knowledge- and skills-based. Regular seminars are organised where students do presentations.
- At Jamshetjee Jejeebhoy (JJ) Hospital, Mumbai practical sessions vary from 2–3 hours to 5–6 hours in a week, depending on the load on the laboratory.

ix. The quality of institutes is determined by their accreditation status, registration with a state council or professional associations/boards and status of affiliation. However, in the absence of a single regulatory authority, the parameters of quality education differ for all education institutes offering allied health courses.

- Most of the colleges offering allied health courses are affiliated with somebody or the other, though these may not be particularly affiliated for the course itself. Of these, 52% are affiliated to a university, 46% to a board and 1% to a statutory body. Details of affiliation are given in Appendix 10. The list contains the names of councils (as mentioned by the institutes) which register and recognise courses at the state/national level. Many of these are not paramedical (allied health) councils.
- Only 25% of the institutes surveyed were accredited. The accreditation bodies varied widely and included the following:
  - International Organisation for Standardisation (ISO)
  - National Accreditation Board for Education and Training (NABET)
  - National Assessment and Accreditation Council (NAAC)
  - Bharat SevaSamaj, Thiruvananthapuram
  - Jammu & Kashmir Government
  - Cochin University of Science and Technology (CUSAT) Department of Medical Education (DME)
  - Indira Gandhi National Open University (IGNOU)
  - International Accreditation Organisation (IAO)
  - Maharashtra Medical Council
  - Dental Council of India (DCI)
  - National Accreditation Board for Hospitals and Healthcare Providers (NABH)
  - HomiBhabha National Institute
  - Para Medical Board, Hyderabad
  - Medical Council of India (MCI)
  - National Board of Examinations (NBE)
  - Rehabilitation Council of India (RCI).

In the strict sense of the term, the above-mentioned institutes are not formal accreditation bodies for allied health courses. However, the institutions understand them as such and have responded accordingly.

c) Teaching

i. Faculty

The following observations were made about the faculty for allied health education during the field visit study of centres of excellence identified by the National Initiative for Allied Health Sciences (NIAHS) secretariat:

- Generally, all institutes of excellence share the faculty members between the medical and allied health courses, and across various departments functioning in the hospital.

There is no separate faculty available in the institutes for allied health courses, except in the case of stand-alone institutes such as AIIPMR, Mumbai and All India Institute of Speech and Hearing (AIISH), Mysore to name a few.

- Most of the faculty members are doctors who teach their respective specialty or retired professors from prestigious institutes like the Armed Forces Medical College (AFMC). The system also comprises allied health faculty members, though the number of students opting for the academic field after graduation or post-graduation is relatively minimal. There seems to be a good demand for quality teaching and training faculty.
- A number of stand-alone institutes seek visiting faculty from medical colleges on subjects like anatomy, physiology, etc. as per their need. Visiting faculty are mainly top experts working in various hospitals who are given a token fee and travel expenses.
- A permanent faculty is appointed only after an advertisement laying down specific eligibility criteria. The selection process includes advertisement for the post, short-listing and interview by an expert panel. Initially, provisional selection is done after which the selected candidate has to take a number of demonstration classes. The selected candidate is confirmed only after getting a positive feedback from the students. At a number of government institutes, one has to clear an exam to be selected as a faculty.
- A newly inducted faculty member undergoes a training of trainer (ToT) programme to understand the expectations of students.
- Faculty knowledge upgradation schemes, such as continuing medical education (CME) in the case of medical courses, are largely absent in allied health streams. Information and knowledge transfer on new technologies and techniques is imparted through various seminars and is largely dependent on the manufacturers from the industry.

ii. Teaching aids

The allied health courses are supported by teaching/learning materials in various forms, namely printed, audio-visual, counselling, teleconferencing, practical sessions, clinical supervision, radio programmes and interactive sessions through telecommunications.

Planned quality assurance measures for allied health courses as documented by a number of institutes include an editorial committee for development of materials, review by a core committee, orientation of academic counsellors (teachers at institutes), monitoring by the respective board or university through surprise visits and feedback from the academic counsellors as well as students

BOX 3: Upgradation of course curricula

During the field visit to centres of excellence as identified by National Initiative for Allied Health Sciences (NIAHS) secretariat, it was observed that

- AYJNIHH, Mumbai undertakes an annual process of upgradation of the course curricula;
- CMC revises the curricula every 4 years;
- IPHH upgrades their curricula every two years after consultation with the healthcare industry and obtaining feedback from the hospitals where students are sent for practical training.

d) Allied health capacity

i. Enhancement in the present number of allied health courses

A significant number of institutions are willing to expand by adding additional allied health courses. The total number of batches that these institutions are willing to add is 435, covering 23 courses. The most common courses that these institutions are willing to add arethe courses for ECG Technician, followed by Central Sterile Supply Department (CSSD) Technician, Emergency Medical Assistant and Dark Room Assistant. The maximum possible increase in capacity is for the course for Emergency Medical Technicians, followed by the courses for ECG Technicians, Anaesthesia Technicians, Ventilator Technicians and CSSD Technicians. The complete details are given in Annexure 3.

ii. Futuristic courses

The colleges were probed to identify the possible courses that they would like to incorporate in the near future. Addressing the need of the market in terms of the technology advancement, colleges identified the courses as indicated in Figure 6. The course on Telemedicine is the most commonly desired futuristic course by the institutions.

BOX 4: Futuristic courses

AIMS has suggested a course of Physician Assistant (as a 3 years abbreviated course) to support the physician. Along with the Emergency Medical Technician (EMT) course, these can address the shortage of doctors in remote areas. Similarly, CMC, Vellore has indicated that persons with MSc (Medical Physics) are needed in large numbers for cancer centres.

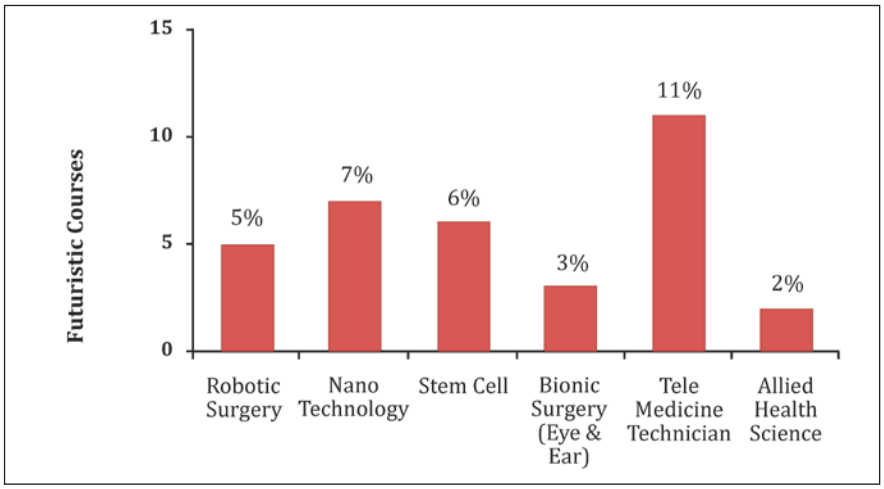
iii. Available seat capacity

Given the abundance of data and the varied quality of education imparted by various colleges considered for the study, it was decided to calculate the intake capacity of only centres of excellence identified by the NIAHS secretariat.

Based on our field visits and research findings, the intake capacities of the following 18 centres of excellence were calculated for various specialties for the different levels of courses:

- Post Graduate Institute of Medical Education and Research(PGIMER), Chandigarh
- GMC, Chandigarh
- All India Institute of Medical Sciences (AIIMS), New Delhi
- Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi
- Maulana Azad Medical College (MAMC), New Delhi

Figure 6: Possible futuristic courses



- KEM Hospital, Mumbai
- Grant Medical College and JJ Hospital, Mumbai
- AIMS, Kerala
- Jawaharlal Institute of Post Graduate Medical Education and Research (JIPMER), Pondicherry
- CMC, Vellore
- Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMS), Trivandrum
- Sri Ramachandra Medical College and Research Institute, Chennai
- Manipal College of Allied Health Sciences (MCOAHS), Karnataka
- AIIPMR, Mumbai (only for the Rehab, occupational therapy and physiotherapy and audio/speech courses)
- AYJNIHH, Mumbai (only for the audio/speech courses)
- All India Institute of Speech and Hearing (AIISH), Mysore (only for the audio/speech courses)
- Sankara Nethralaya, Chennai (only for the opthalmology courses)
- DCI (only for the dental courses).

The results of this review are summarised in Table 2.

The complete details of seats available at each institute are given in Annexure 4. Dental hygienists and dental mechanics were estimated based on the 22 recognised institutions as reflected in the Dental Council of India website (www.dciindia.org).

e) Professional partnerships and Placement

Most of the colleges lack placement cells, though some colleges have MoUs with hospitals for placement of their graduating candidates. It was evident from the desk review that placement is not a phase but a continuous process of rapport building of such institutes with the market drivers

Table 2: Available seat capacities of the centres of excellence for various specialties

Sl. No	Specialty	Certificate	Diploma	Degree	Masters	PG Diploma	Doctorate
1.	Optometry	5	8	104	6	0	10
2.	Rehabilitation	0	0	35	4	0	0
3.	Occupational Therapy and Physiotherapy	0	40	245	112	0	0
4.	Audiology and Speech Language Pathology	0	453	177	166	20	8
5.	Cardiothoracic Related Technology	3	5	47	27	16	0
6.	Medical Laboratory Technology	37	52	77	252	12	10
7.	Radiography & Imaging Technology	3	19	107	21	8	0
8.	Medical Technology	0	12	10	25	12	2
9.	Dental Assistance Related Technology	0	2009	0	0	0	0
10.	Emergency Trauma & Critical Care Technology	48	6	55	0	0	0
11.	Operation Theatre Related Technology	0	26	20	6	0	0
12.	Administrative and Miscellaneous	23	28	96	121	73	39
Total number of seats – 4700							

BOX 5: Placement in Allied Health training institutes

- At AIIPMR, Mumbai, students usually get placed in the hospital's occupational therapy and physiotherapy departments.
- AIMS hasregistered a s 100% placement of all graduates.
- CMC, Vellore alumni get jobs in the private sector, or go overseas.
- IPHH has signed memoranda of understanding (MoUs) with major hospitals in Delhi.
- The post-BSc courses at SCTIMST produce very few but highly skilled and specialised graduates; naturally, traditional career paths for such students in these fields are almost non-existent.

Placement as faculty members

AIMS provide a stipend after the second year as the students help in the hospital for cost effectivity. Masters students at AIIPMR, Mumbai are absorbed in the teaching disciplines in its own institutes and other recently established educational institutions. Students of AYJNIHH, Mumbai are encouraged by the Institute to join as faculty members. After BSc, one can become a tutor at CMC, Vellore. At PGIMER, teaching competence is checked on the basis of student performance or spot watching of the class by a senior faculty. Students who complete MSc and PhD are spot watched for teaching ability, and deployed.

Additionally, the following findings were specific to the centres of excellence:

i. Tie-ups and partnerships
   - Technology-driven partnership: EISE and J&J have entered into an educational partnership with the Federation of Obstetric and Gynaecological Societies of India (FOGSI) to link up 100 medical colleges in India using the EDUSAT technology of the Indian Space Research Organization (ISRO) for medical education, primarily for the gynaecologists in medical colleges across India. Presently the programme is conducted in 10 colleges on the fourth Sunday of every month.
   - Skills development-based tie-ups: Students from AIIPMR visit the departments in Karamshi Jethabhai Somaiya Medical College, Mumbai for subjects related to medical fields. For the prosthetics and orthotics courses, there is a requirement of skills in crafting, leather work and basic engineering skills, which they upgrade from the engineering colleges in the vicinity of the Institute.
   - Tie-ups and partnerships for endorsements: Most of the courses conducted at EISE and J&J are endorsed by prestigious surgical bodies.
   - Employer tie-up: IPHH has signed MoUs with major hospitals in the National Capital Region (NCR) of Delhi such as New Delhi Municipal Council (NDMC) Hospitals, Artemis, Fortis, Max and Medicity, to name a few. These hospitals are the major recruiters as well as providers of inputs to the institutes for improvements/changes in the curriculum as per newer developments in the field/market because of newer technology/demand. These hospitals also provide practical training to the students.

ii. Practical-driven courses: Practical sessions are carried out in hospital so that the students get hands-on experience.

iii. A feedback-based system is followed for improvisation in the syllabus, courses, training curricula, etc.

iv. Incorporation of the latest techniques in the training modules as a regular feature

v. EISE, J&J, AIMS, CMC, etc. have launched a need-driven course involving different stakeholders, based on the competitive requirements.

vi. Innovative systems: Students who are not performing well are encouraged through the following measures:

- Hands-on training on clinical training programmes, carried out at three levels:
  - Observation
  - Carrying out procedures and processes under strict supervision
  - Carrying out procedures and processes under minimal supervision
- Repeated posting in those areas where the students need reinforcement, including individual tutorials once a week.

Perceptions of Allied Health Professionals

As indicated in the methodology, interviews and focus group discussions were conducted with students and AHPs to identify the perceptions of the practising cadre. The findings are enumerated below.

a) Review by students pursuing allied health courses

When asked why they entered this profession, 57% of the students said that they wanted to be of service to humankind, 26% said they wanted to be associated with the medical profession and 17% were taken up by the prospect of rehabilitation and healing without medicines.

Although they echoed the feeling of being neglected and felt that the situation was better abroad, 77% of students felt that their profession had sufficient demand in India. Forty-five per cent felt that there was adequate demand, but due to the lack of sufficient posts being created, most of them remained unemployed. Overall, among the issues raised, 85% felt that their profession received inadequate salaries and 69% of them demanded representation by a separate council.

Though a considerable section (60%) of students undergoing physiotherapy courses thought autonomy of the profession was a solution to most of their problems, 40% suggested increased hiring in government and multispecialty hospitals, and felt that PHCs would address the employment gap and needs.

BOX 6

Nine hours of work=no money. Do you think anybody would be happy like this? Am working, atleast pay me accordingly! Give me my right!' – Physiotherapy student

Other issues raised by students from various specialties are given in the figures below.

BOX 7

'I cannot recommend this course to anyone as I myself am not satisfied with the quality of education we are receiving.' – Speech therapy student

Figure 7: Issues raised by speech therapy students

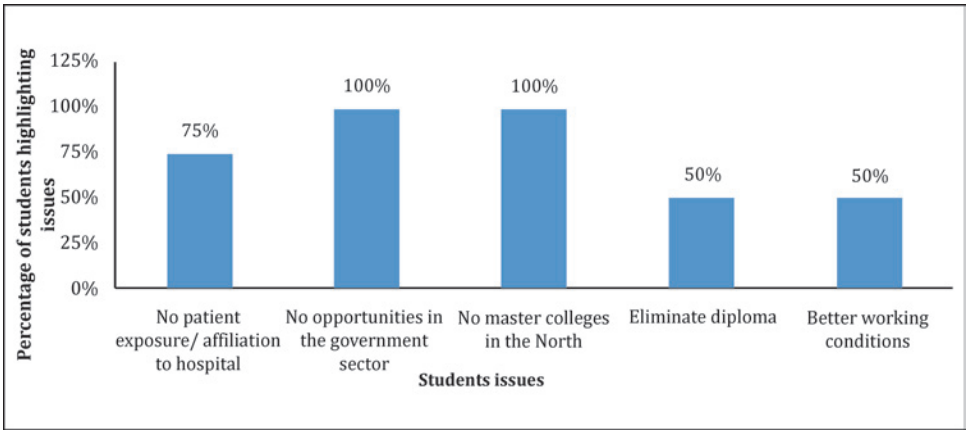
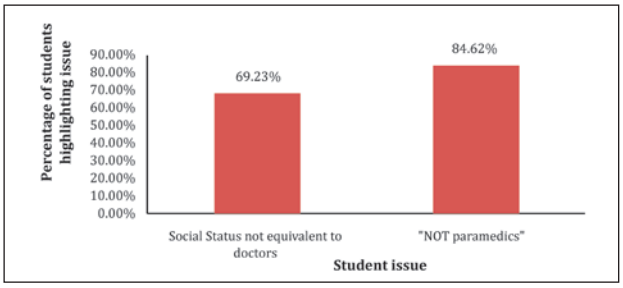


Figure 8: Issues raised by occupational therapy students



BOX 8

'We integrate an individual in society considering his mental, social and psychological level and other aspects, but what do we get in return? Decrementing status and a 'Grade C' tag in terms of pay, job opportunity, future scope of the profession, respect and dignity.' – Occupational therapy student

BOX 9

'I just think it is better to do a professional course instead of studying.' – Radiotherapy student

Facts gleaned from discussions with practising allied health professionals

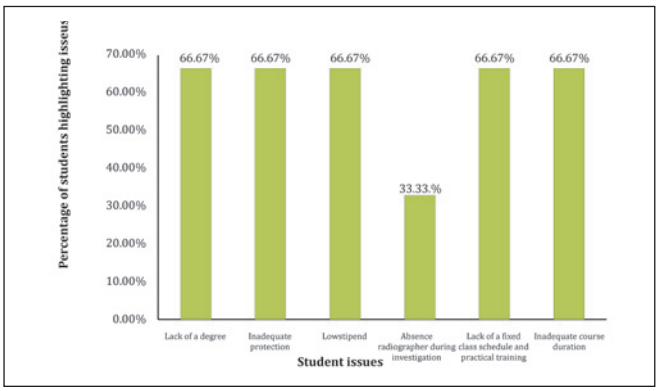
i Prosthetics and Orthotics

- The course and all the colleges offering it are completely managed by the Rehabilitation Council of India (RCI) which falls under the Ministry of Social Justice and Empowerment, except Safdarjung Hospital, Delhi and All India Institute of Physical Medicine and Rehabilitation (AIIPMR), Mumbai which come under the MoHFW.
- The RCI recognises certificate and diploma courses at the same level, which needs to be rationalised.
- The course has very few job openings in both public and private healthcare delivery systems.
- University Grants Commission (UGC) scales have not been defined despite the presence of teaching cadres.

ii Medical Lab Technologists

- This course is handled by a varied list of regulatory bodies; hence no list of registered professionals exists. Natures of duties have not been updated since the early 1970's.
- The demand for enhancing risk allowance was not acceded to. Those with technical skills end up doing administrative work, which takes up most of their time.

Figure 9: Issues among radiotherapy students



- Most of the professionals do not get automated lab training.

iii Occupational Therapists

- Occupational therapists are regulated by the All India Occupational Therapists' Association (AIOTA) but it is not recognised by the Central Government. Four national institution and 13 recognised courses exist in the country.
- As per a court, they do not come under the purview of the RCI.
- Guidelines of World Council of Occupational Therapy are followed in the other parts of the world. In most places, the World Council of Occupational Therapy guidelines are in use. As per a court order, they do not come under the purview of the RCI. The profession is gazetted only in Bihar and Haryana. Jobs in this sector do not pay much except for those in private practice, since their charges are higher.

iv Physiotherapists

- This cadre is regulated by the Indian Association of Physiotherapists (IAP), which has 35,000 live registered practitioners in place. There are many more who are not registered with the Association.
- The Government recruits those with a bachelor's qualification at the gazetted level, while the UGC recruits those with a master's qualification as faculty.
- Salaries for this sector have not been revised after the 6th Pay Commission.
- Courses are recognised by the respective universities. There is no standardisation of the curricula across the entire country.

v Optometry

- The World Council of Optometry (WCO) classifies optometry as an independent primary healthcare profession. The Council defines optometrists as 'primary healthcare practitioners of the eye and visual system who provide comprehensive eye and vision care, which includes refraction and dispensing, the detection/diagnosis and management of diseases of the eye and the rehabilitation of conditions of the visual system'. The entire group suggested establishing a separate council for this profession and stated that they should not be considered under the ambit of AHPs. Detailed documentation on optometry as provided by Indian Optometry Federation is given in Appendix 11.

vi Audiology/ Speech Language Pathology

- The RCI maintains a live register of this specialty.
- Unregistered practising is illegal.
- Audiology and Speech Language Pathology are usually separate disciplines for the purpose of specialisation, but this is not followed in the Indian context.
- Around 900 professionals graduate annually, but posts are inadequate due to the absence of designated posts in the government system. Private sector employment opportunities are more easily available and offer comparatively better packages.

vii Radiology/Imaging Technology

- Bhabha Atomic Research Centre (BARC) is the regulatory body for this specialty. Colleges are few, such as AIIMS, LokNayak Jai Prakash Hospital in Delhi and PGIMER, Chandigarh.

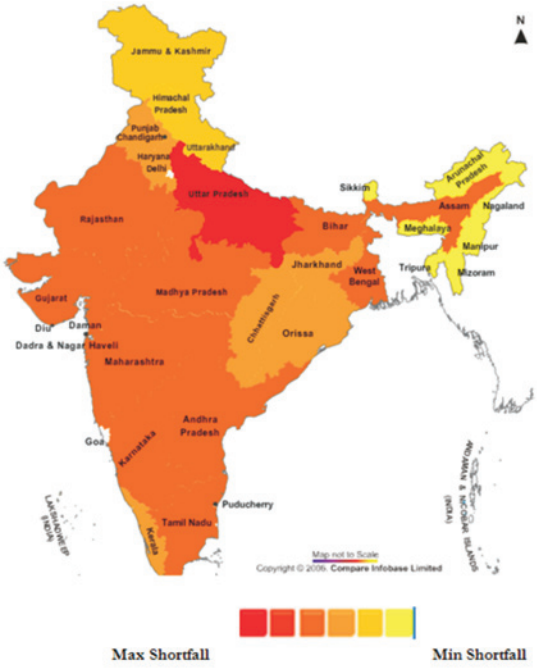
vii Operation Theatre Technologists

- The entry qualification is tenth standard with two years of experience.
- Barely any training is given and those in this field are hired only on the basis of their prior experience.
- Most of the hospitals have their own in-house training courses.

b) Demand for allied health professionals in the country

The findings indicate an overallnational shortage of approximately 64 lakh AHPs, with the highest

Figure 10: Heat map showing allied health workforce shortage (based on access and efficiency adjustments) in India across different states



deficiencies being in the states of Uttar Pradesh, West Bengal, Maharashtra, Bihar and Andhra Pradesh. Figure 10 indicates the shortages based on access and efficiency adjustments in India across various states.

Shortfall at the national level

The national level estimates on the shortfall of the various categories of AHPs are indicated in Table 3.

Table 3: Estimates on shortfall of allied health human resources at the national level

Sl. No	Health workforce category	Demand	Supply	Unadjusted gap	Efficiency and access adjusted gap
1	Ophthalmology related	145236	17678	127558	136,039
2	Rehabilitation related	1862584	40265	1822319	1841637
3	Surgical and intervention	205088	7215	197873	208618
4	Medical laboratory	76884	15214	61670	70603
5	Radiography and imaging	23649	4352	19297	20971
6	Audiology and speech language	10599	3263	7336	8901
7	Medical technology related	239657	3587	236070	237791
8	Dental assistance technology related	2048391	6243	2042148	2045143
9	Surgery and anaesthesia	862193	4050	858143	860086
10	Miscellaneous	1074473	181511	892962	980045
	Total				

i Based on adjusted estimates, the largest gap of about 23,000 ophthalmology professionals was found in Uttar Pradesh followed by Maharashtra (12,600) and a moderate gap of 10,300–12,000 workers in Bihar and West Bengal. Andhra Pradesh was found to have the fifth-largest gap based on adjusted estimates (9,100).

ii The gap of rehabilitation-related professionals was the second largest among all the AHP categories included in this analysis. Based on efficiency and access adjustments, gaps were found in Uttar Pradesh, Bihar, West Bengal, Maharashtra and Andhra Pradesh in large numbers ranging from 2,40,800 to 1,08,100 workers per state.

iii Results based on adjusted indices showed the largest gap of 34,600 workers for surgical and intervention technologies in Uttar Pradesh. Moderate gaps in the range of 18,000 to 19,300 were found in Maharashtra and Bihar. West Bengal and Andhra Pradesh had gaps in the range of 14,400 to 15,700.

iv Medical laboratory technicians are needed mostly in Uttar Pradesh of the order of 12,200 professionals (adjusted). Adjusted estimates obtained ranged from 6,500 to 4,500 for Maharashtra and Bihar.

v Healthcare workers specialising in the fields of radiology and imaging are one of the least needed allied health cadrein India. The greatest need is in Uttar Pradesh (adjusted estimate 3,600). Other states with gaps are Maharashtra, Bihar, West Bengal, Andhra Pradesh, Gujarat, Assam and Delhi.

vi Audiology- and speech-related professionals account for the smallest gap among all types of AHPs included in this analysis, with 1,500 needed in Uttar Pradesh based on adjusted estimates. Other states that have large gaps include Maharashtra, Bihar, West Bengal, Tamil Nadu and Andhra Pradesh.

vii A total of 39,300 medical technologists are needed in Uttar Pradesh. The requirement in the states of Maharashtra, Bihar, West Bengal and Andhra Pradesh range between 16,500 and 22,000, taking into account access and efficiency parameters.

viii Dental technologists account for the largest gap among all types of AHPs included in this analysis, with the maximum need being in Uttar Pradesh of about 3,37,400 (adjusted). The gaps in other states like Maharashtra, Bihar, West Bengal and Andhra Pradesh are significantly less than that in Uttar Pradesh, ranging from 1,42,900 to 1,90,000 (adjusted).

ix Healthcare professionals helping in surgery and anaesthesia also add significantly to the gap of AHPs in India. Again, Uttar Pradesh has the largest gap of 1,42,100. Other states of interest include Maharashtra, Bihar, West Bengal and Andhra Pradesh with gaps ranging from 60,000 to 80,000 based on adjusted estimates.

x The gap of miscellaneous technologists also contributes to the gap of AHPs in India, specifically in Uttar Pradesh (1,68,000 adjusted). The gap in other states such as Maharashtra, Bihar, West Bengal and Andhra Pradesh is less than 94,100, taking into account the efficiency and access adjustment factors.

c) Gaps at the state level

- Figures 11 to 13 below show the top five states where the gaps (adjusted and unadjusted) are the largest. Results for all states by specialisation categories are given in Annexure 5.

Figure 11: Shortfall of allied health professionals in Uttar Pradesh and Maharashtra

Surg & anaes- Surgery and Anaesthesia,

Opth - Ophthalmology

Surg & int tech-Surgica and intervention Technology

Med Labs- Medical lab Technology

Radio & imag- Radiography and imaging Technology

Audio & splang- Audiology and Speech language pathology

Med Tech- Medical Technology

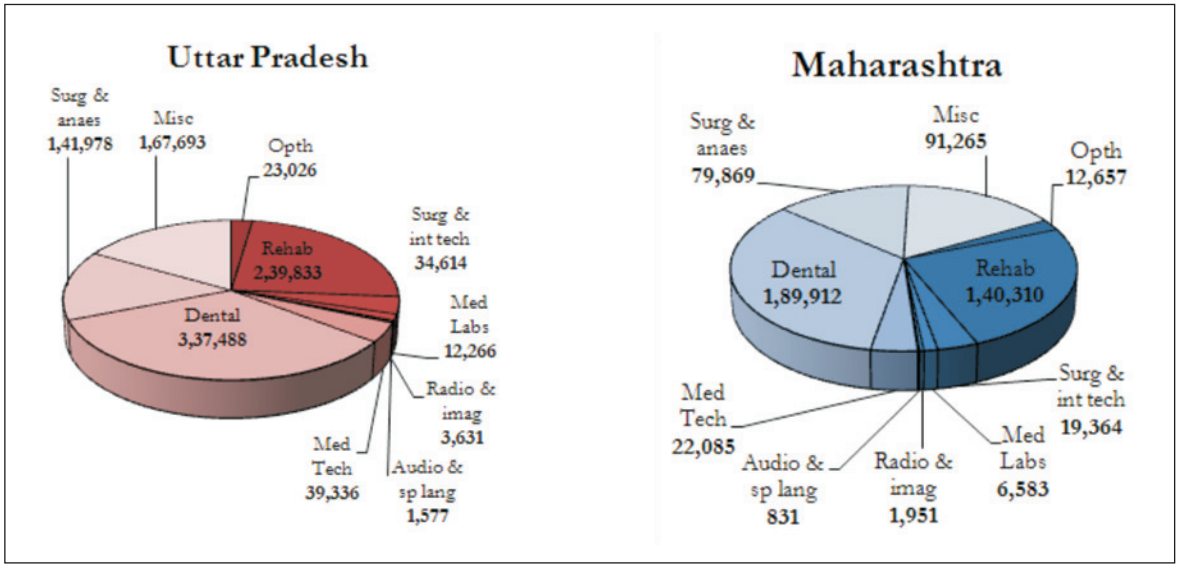


Figure 12: Shortfall of allied health professionals in Bihar and West Bengal

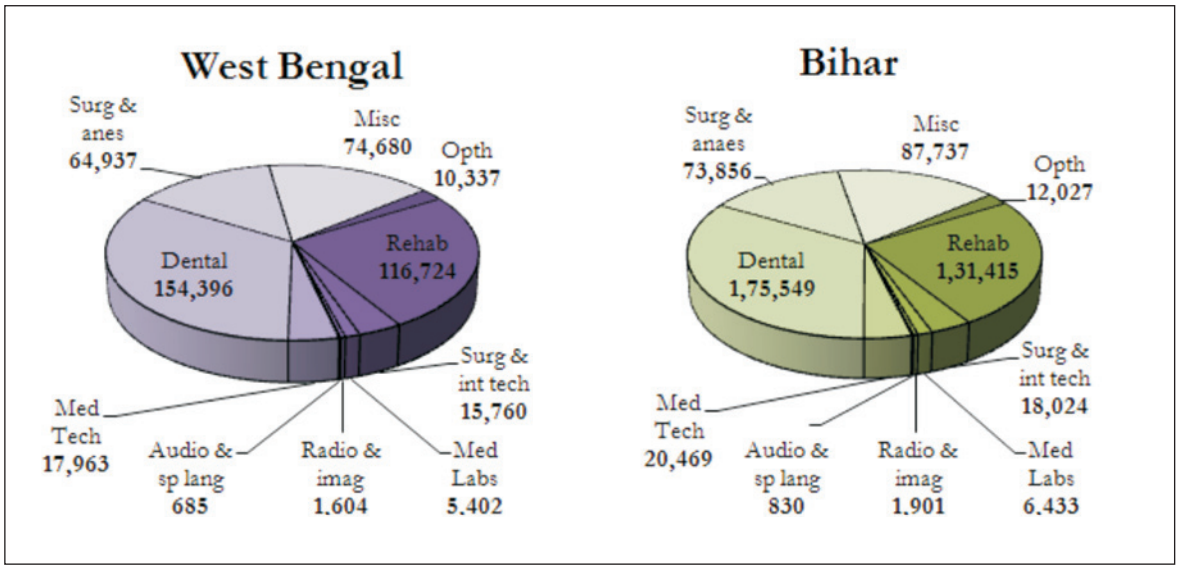
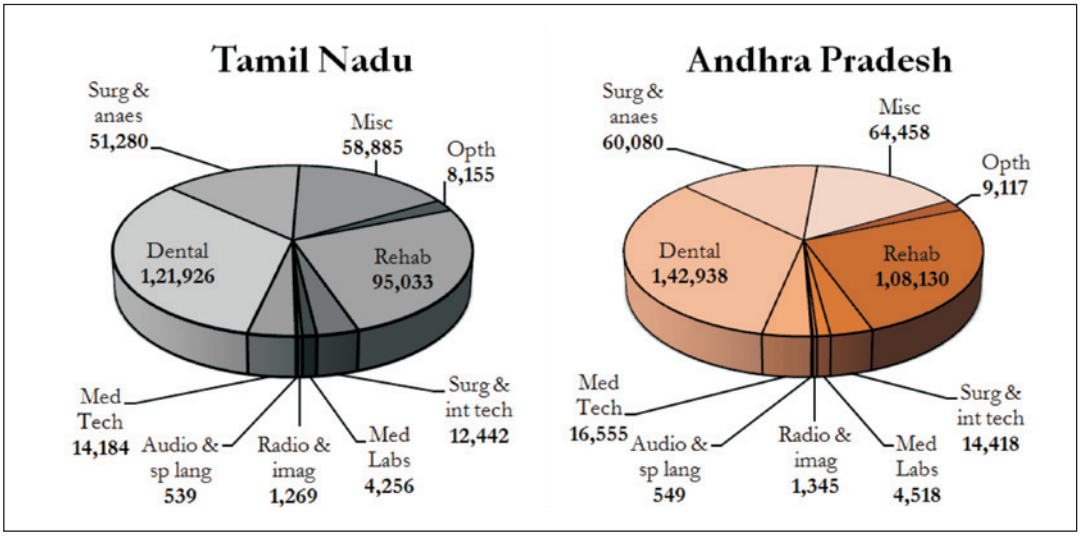


Figure 13: Shortfall of allied health professionals in Andhra Pradesh and Tamil Nadu



3. Policy issues for consideration

Based on the analysis using adjusted estimates, the following recommendations were made to help in informed decision-making for expanding the infrastructure of healthcare training institutions:

- For all categories of allied health specialisation, there was a consistent gap found in five states in the following order: Uttar Pradesh, Maharashtra, Bihar, West Bengal and Andhra Pradesh (Figure 14). Hence, it is imperative to either set up institutions or increase the number of seats in existing colleges in all these five states so that training for all types of allied health categories can be covered.

Figure 14: States with the largest gaps of allied health professionals

- The order of importance, based on the largest to the smallest need from this gap analysis of AHPs, is as follows:

  1) Dental assistance-related technologist
  2) Rehabilitation therapist
  3) Miscellaneous (dietician)
  4) Surgery and anaesthesia technician
  5) Medical-related technician
  6) Surgical and intervention-related technician
  7) Ophthalmology technician
  8) Medical laboratory technologist
  9) Radiography and imaging technologist
  10) Audiology and speech language pathologist

4. Recommendations

The huge shortage of well-qualified human resources in the health services is one of the major reasons for the high rates of morbidity and mortality in India. However, addressing this issue is not an easy task because of the large number of stakeholders involved. The section on situation analysis/findings of the study gives an overview of the extent to which colleges offering allied health courses have mushroomed across India under undefined regulatory mechanisms. A moratorium on further expansion of such colleges is required till these commercial distortions and fall in standards are adequately addressed.

A proposal was put forward in May 2010 to the Cabinet for its decision to augment the supply of skilled paramedical (allied health) human resources and to promote the quality of paramedical (allied health) training through standardisation of such education/courses across the country.

It was decided to support human resource development through support to state government medical colleges in the form of a one-time grant; by establishment of a National Institute of Paramedical Sciences/National Institute of Allied Health Sciences (NIPS/NIAHS); and by establishment of eight regional institutes of paramedical sciences/regional institutes of allied health sciences (RIPS/RIAHS).

In order to provide well-regulated quality education in allied health streams, and to address the allied health human resource shortages in the country, some of the key recommendations for consideration by the MoHFW are enumerated below.

Recommendation: 1

The decision by GoI to establish a National Institute of Allied Health Sciences (NIAHS) with state-of-the-art facilities, offering higher-order/postgraduate courses in various allied health streams is timely and should be implemented in a time-bound manner. It should serve as a centre of excellence for the allied health profession, educational practices and associated institutions.

We have also recommended the functional and administrative framework for the NIAHS to function as a centre of excellence for allied health professions. The National Institute for Allied Health Sciences will be set up at Najafgarh, New Delhi, affiliated to a 100-bedded hospital in the campus. The details are given in Appendix 12.

a) Mandate of the NIAHS

The NIAHS is expected to perform the following roles as a central body in the field of allied health education:

i. To serve as the seat of learning for a limited number of graduate and postgraduate programmes at its location

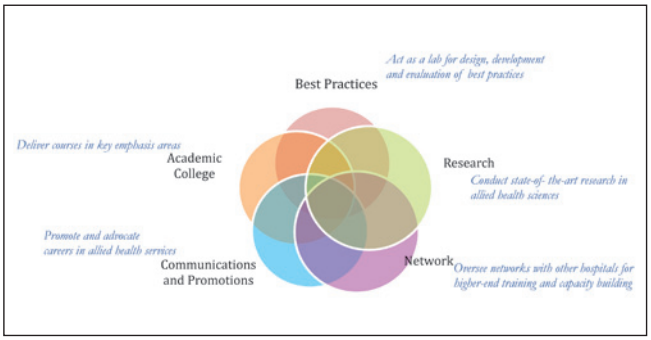
ii. To perform a central coordinating role for running off-site/long-distance programmes through long-term sponsorships in different parts of the country

As described in the figure above, NIAHS should undertake the following roles:

i. NIAHS as a best practices lab

- NIAHS has the opportunity to function as a test bed for developing a national strategy for best practices in allied health sciences.
- The best practices lab's goal would be to

Figure 15: Role of the National Institute of Allied Health Sciences (NIAHS)



enhance patient safety and quality of medical care through the use of innovative, high-impact training and research.

- These best practices can be systemwide involving many domains, or focus on innovations in an identified thrust area.

ii. NIAHS as a research body

- The role of the NIAHS to promote and accelerate research in allied health sciences is critical for the future of the healthcare system in India.
- It is imperative that research and scientific investigations should include a sustained effort towards understanding the human resource landscape of allied health sciences and include a needs projection.
- The research will be funded by intramural funds as well as funds from central, state and international grants.
- NIAHS will maintain and collate live registers of all graduating students of different specialties from all RIAHSs and timely update information at the national level for further research on the demand–supply gap and analysis at the national and regional levels.

iii. NIAHS as an academic institute

- As an academic institute, NIAHS should have the roles of teaching and coordinating courses at all levels.
- NIAHS may be made responsible for designing, formulating and updating course curricula on an ongoing basis.
- It is recommended that NIAHS be recognised for granting graduate, postgraduate and doctorate degrees.
- NIAHS should develop the capacities of the RIAHSs and partners for skills training, system-based practices and team training.
- Career counselling, career path advancement, and effective placement of the students may be undertaken through the establishment of a placement cell within NIAHS.
- NIAHS should undertake ToT and faculty development programmes for standardisation of training across the country.
- NIAHS should ensure that the evaluation and assessment of students graduating from NIAHS is done using the standards set by the National Board of Allied Health Sciences (NBAHS).

iv. NIAHS as a promoter

- NIAHS should serve as a champion that vigorously advocates for careers and investment in allied health sciences.
- NIAHS should also institute a communication, promotion and advocacy division under the office of the Director. The mandate of this office would be to publish material for a scientific audience, lay audience and policy-makers on allied health services.

v. NIAHS as a networking body

- NIAHS should develop formal relationships with various local hospitals in the NCR for

participating in training programmes as per their capacity, as well as with the national centres of excellence for various specialties.

- NIAHS should develop partnerships with professional associations or networks such as the RCI. NIAHS should constitute a national pool of experts who will serve as a technical resource base for the various functions of NIAHS. Technical assistance may be sought from development partners to constitute the pool as well as orient it to good practices followed in other parts of the world.
- NIAHS should collaborate with the departments of school education, regional institutes and the industry. Meaningful partnerships should be established for development of the allied health sciences curricula, which could be incorporated in school education programmes, especially in science courses.
- NIAHS should develop a culture of affiliation and collaboration with the private sector. The industry can partner NIAHS to support the allied health educational institutions through provision of qualified and experienced allied health staff as guest faculty on a regular basis. It can also provide opportunities for faculty and students to explore and practise the latest updates on healthcare technologies.

Recommendation 2

The study also endorses the decision on the establishment of eight Regional Institutes of Allied Health Sciences (RIAHSs) that we envision will serve as regional centres of excellence in allied health and work in close collaboration with the national institute of Allied Health sciences (NIAHS). RIAHSs should primarily focus on undergraduate degree, diploma and certificate programmes along with postgraduate degrees and also leverage existing specialty strengths of the various allied health cadres in the region.

It is also imperative to establish regional centres on the line of NIAHS in various regions of the country to provide similar opportunities at multiple locations across India. The government has therefore taken the initiative to establish eight regional institutes. However, the study indicates a need to review the location of RIAHSs in order to address the currently obtaining skewed distribution of these institutes.

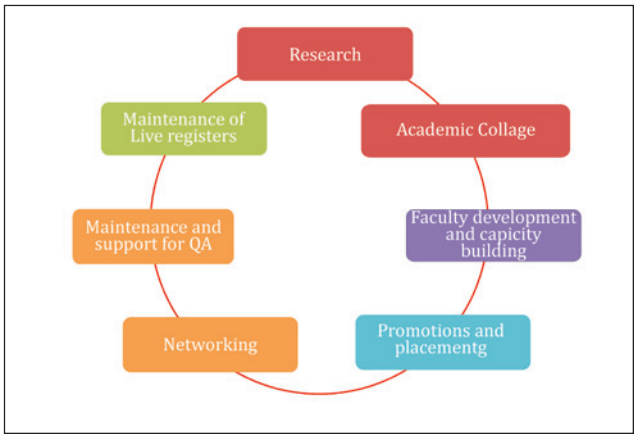
Functional overview of RIAHSs

As shown in Figure 16 above, RIAHS should undertake the following roles:

i. RIAHS as a research body

- RIAHS should conduct state-of-the-art research in allied health sciences, especially with respect to emerging disease patterns, technological trends, cultural and

Figure 16: Functional overview of RIAHS



demographic shifts and local epidemiology pertaining to their respective regions.

- The research should be funded by intramural funds as well as funds from central, state and international grants.

ii. RIAHS as an academic institute

- RIAHS should deliver courses in key allied health disciplines, with a focus on postgraduate degrees, undergraduate degrees, diplomas and certificate programmes. RIAHS should provide technical support to NIAHS for designing, formulating and updating course curricula on an ongoing basis. These will be directly related to those specialties that are currently dominant in the region.
- Ensure the ongoing evaluation and assessment of students graduating from RIAHS using the standards set by NBAHS.

iii. RIAHS as a faculty development and capacity-building institute

- RIAHS should identify and train faculty in allied health sciences on an ongoing basis, develop ToT protocols and build training capacity.
- RIAHS should undertake skills training, system-based practices and team training.
- RIAHS should provide technical experts to NIAHS for ToT and faculty development programmes at the national level.

iv. RIAHS as a promoter and placement agency

- RIAHS should serve as a champion to vigorously promote and advocate careers and investment in allied health sciences, especially in the local community.
- RIAHS should mentor graduating students and help them to obtain high-quality internship options and eventually long-term placements.

v. RIAHS as a networking body

- RIAHS should continuously network with regional/state medical and other institutions as well as state health departments to ensure a supply–demand balance and practical training sites.
- Develop formal relationships with various local hospitals in the region for participating in the training programmes as per their capacity, as well as with national centres of excellence for various specialties.
- Develop linkages with other regional institutes of allied health sciences.
- Together, all RIAHS to constitute and orient a national pool of experts who shall serve as a technical resource for the various functions of RIAHS.
- Collaborate with the departments of school education, the regional institutes and the industry in building meaningful partnerships for development of the allied health sciences curricula. This could be incorporated in school education, especially in science courses.
- RIAHS should develop a culture for affiliation and collaboration with the private sector. The industry can partner to support the allied health educational institutions through provision of qualified and experienced allied health staff as guest faculty on a regular basis. It can also provide opportunities for faculty and students to explore and practise the latest updates on healthcare technologies.

vi. RIAHS as a quality assurance enabler

- RIAHS should maintain updated quality assurance (QA) data on both certification of courses and accreditation of institutions to be fed to NIAHS and eventually to the NBAHS for continuous QA.
- RIAHS should provide support to other institutions for instituting QA.

vii. RIAHS as an AHP record-keeper

- RIAHSshould maintain live registers of all the graduating students of different specialties and feed the data to NIAHS to update information at the national level, and for further research on the demand–supply gap in different regions.

Recommendation 3

The phasing plan of the regional institutes and the planned seat capacity should be based on the findings of a specialty-wise demand–supply gap analysis for maximum reach and effectiveness.

Based on a modelling exercise that was conducted in partnership with GE's Healthy Imagination Group, certain key gaps in specific specialty areas of the allied health workforce came to light. It is desirable to undertake a more detailed demand–supply analysis in each of these states in conjunction with the state health leadership before finalising the implementation plan for the regional institutes.

The number of seats derived from various sources were then compared with the need gap analysis (in conjunction with GE) that estimated gaps per specialty based on population growth trends over the next ten years proportionally to the base number of seats as indicated in the Cabinet note (Annexure 6). The difference was calculated both in terms of real numbers as well as a ratio by finding the weighted average of intake as well as need gap. A modifying factor was introduced and multiplied with the difference between the need gap and the intake number, to ensure that in no case was the number of seats less than the gap estimated.

The factor was also manipulated such that basic ground rules for capacity building and GoI priority areas for public sector post creation were adequately represented (labs, radiology, audiology, etc.). Areas in which there were large gaps as estimated by the analysis such as rehab, surgery, anaesthesia related courses and miscellaneous courseswere duly weighted with a much higher average seat capacity. (Rehab courses are inclusive of occupational and physical therapy courses.)

The top five states with maximum deficiency for each of the major specialties are indicated below. The projected capacity of education which can be created is outlined on the basis of the GE Report (annexure-7)

Table 4: States with maximum estimated deficiency of AHP

Specialization category	States/union territories
Ophthalmology, Rehabilitation, Radiography and Imaging, Surgical and Intervention, Medical Technologies, Surgical and Anesthesia, Dental and Miscellaneous	Uttar Pradesh, Maharashtra, Bihar, West Bengal, Andhra Pradesh
Medical Laboratory and Audiology and Speech Language	Uttar Pradesh, Maharashtra, Bihar, West Bengal, Tamil Nadu

BOX 10: Growth of Allied Health courses in states

- For all categories of allied health specialisation except surgical and intervention, there was a significant gap found in two states – Uttar Pradesh and Maharashtra. Thus, it may be recommended that training institutions specialising in all categories of interest (except surgicaland intervention) are needed in both these states. Courses in surgical and intervention are most needed in Madhya Pradesh and Orissa.
- Significant gaps of some AHPs were also found in Delhi and Tamil Nadu. Colleges focusing on training courses for optometrists, blood bank technicians, radiotherapists, dental assistants and hygienists, pre-hospital trauma technologists and public health education professionals could be set up to help reduce the gaps in these healthcare areas in these two states.
- Training institutions offering courses in the area of rehabilitation such as psychologists, vocational counsellors for the handicapped, social workers and community-based rehabilitation professionals are needed the most in the union territories of Andaman and Nicobar, Dadra and Nagar Haveli, Lakshadweep, Daman and Diu and Puducherry.
- Setting up colleges offering dietician-related courses could be of interest in Orissa and Tripura

Based on the modelling exercise, seat capacity as given in Table 5 was calculated and presented to the MoHFW for consideration.

Table 5: Recommended seat capacity by states based on data modelling study

Zone	Hill Region and North	Uttar Pradesh & Uttarakhand	North Central	West	AP & Karnataka	South	East	Bihar / Jharkhand	North East	Total
RIPS location	Chandigarh	Lucknow	Bhopal	Aurangabad	Hyderabad	Coimbatore	Bhubaneshwar	Patna	Aizawl	
Ophthalmology	19	38	31	33	25	19	24	26	11	225
Rehab related	251	517	418	443	334	264	321	353	155	3057
Surgical intervention	28	58	47	50	38	30	36	40	18	345
Medical labs	10	20	16	17	13	10	12	14	6	117
Radiography/imaging	3	6	5	5	4	3	4	4	2	35
Audiology/speech related	1	3	2	2	2	1	2	2	1	15
Medical technology related	32	67	54	57	43	34	41	46	20	394
Dental related	278	572	463	491	370	292	355	391	172	3385
Surgery and anesthesia related	117	241	195	207	156	123	149	165	72	1424
Miscellaneous	134	274	222	235	177	140	170	188	82	1623
Total	**874**	**1795**	**1453**	**1540**	**1161**	**916**	**1114**	**1228**	**539**	**10620**

After the preliminary report was submitted to the MoHFW, NIAHS secretariat was asked to design a more equalised distribution table across all the regional institutes and key specialties across the nation. The calculations also considered the available seat capacity in the various centres of excellence, factoring it to reach to a reasonably well-distributed seat capacity (Annexure 7). The modified seat capacity by regions is as given in Table 6

Table 6 Modified (adjusted) seat capacity by states based on seat capacity

Zone	Hill Region and North	Uttar Pradesh & Uttarakhand	North Central	West	AP & Karnataka	South	East	Bihar / Jharkhand	North East	Total
RIPS location	Chandigarh	Lucknow	Bhopal	Aurangabad	Hyderabad	Coimbatore	Bhubaneshwar	Patna	Aizawl	
Ophthalmology	43	89	72	77	58	46	55	61	27	529
Rehab related	216	443	359	380	287	226	275	303	133	2623
Surgical intervention	41	84	68	72	54	43	52	57	25	497
Medical labs	72	148	120	127	96	76	92	101	45	877
Radiography/Imaging	61	125	101	107	81	64	78	86	38	741
Audiology/speech related	57	117	95	100	76	60	72	80	35	691
Medical technology related	63	130	105	111	84	66	81	89	39	768
Dental related	113	233	188	200	151	119	144	159	70	1,377
Surgery and anesthesia related	105	215	174	185	139	110	133	147	65	1,272
Miscellaneous	102	211	171	181	136	107	131	144	63	1,246
Total	**874**	**1,795**	**1,453**	**1,540**	**1,161**	**916**	**1,114**	**1,228**	**539**	**10,620**

Courses also need to be conducted by specialty at both the national and the regional institutes in a phased manner based on the demand–supply gap by region and by epidemiological needs. In addition, the ability to successfully affiliate/partner with local institutions of excellence and thus ensure faculty and infrastructure availability will also determine the roll-out of certain specialty courses.

Over a period of time, all the courses will be conducted by NIAHS and RIAHSs, either directly by them or through partner institutions. Phasing in of courses will be based on the following concerns:

- Immediate availability of resources (faculty, space, lab, agreeability of the institute to do the course, availability of the specialty within the facility or in the partner institution and funds)
- Standardisation of the courses by NIAHS
- Availability of private institutions willing to partner and undertake courses
- Development of infrastructure of NIAHS and RIAHSs as envisaged in the plan

Recommendation 4

We recommend that the operations of NIAHS be carried out through a chain of off- site campus, affiliates and satellite centres. Therefore, the NIAHS and RIAHS practise and affiliation management committees should empanel/recognise institutions based on the accredited list as derived from the national board. This would enable the system to leverage the existing teaching and training calibre in allied health.

NIAHS should operate through a chain of off- site campus, affiliates and satellite centres to reduce the allied health human resource gap in the system. These affiliations should be developed with existing

institutions of excellence, and NIAHS should provide overall leadership. NIAHS, Najafgarh should develop the budget line to support these clusters of institutions and also provide technology support as per the need. The affiliations should be developed as shown in Figure 17.

a) NIAHS off- site campus

Off-site campuses will be private or public institutions which would mirror the NIAHS. An off-site campus should be part of the NIAHS. It could be located far from the Najafgarh centre, anywhere across India. These sites will run specialised allied health courses under the supervision of NIAHS. Certification should be granted by the NIAHS. NIAHS, Najafgarh will maintain constant online contact with these sites and general subject classes should be webcast to the various off-site campuses as per pre-decided timetables. The facilities at off-site campuses should be as recommended by the NIAHS, Najafgarh.

The NIAHS budget line should provide funding support to the off-site campuses. The overall management of these institutions should continue to be with the mother institutions. A detailed MoU between NIAHS, Najafgarh and the concerned institution can govern the administration of the site.

To address the supply–demand gap immediately, it will be feasible to leverage the capacity of existing centres of excellence such as the AIISH for speech and audiology-related courses, AIIPMR, Mumbai, for rehabilitation-related courses and Sankara Nethralaya for optometry-related courses, to name a few. This will enable NIAHS to gain through the existing capacities to bridge the gaps.

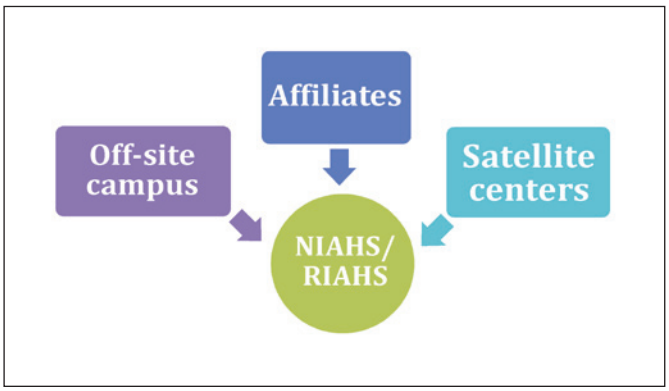
b) NIAHS affiliates

Affiliates will be private or public institutions where allied health education courses are presently being run. These would typically be the medical colleges. The affiliate centre will adopt the NIAHS approved education course, curricula and teaching protocols and be a shadow NIAHS. The affiliate will give certifications through the NIAHS.

NIAHS, Najafgarh will maintain online contact with the affiliates. General subject classes should be webcast to the various affiliates for optimum utilisation of faculty. The NIAHS budget line should provide funding at a pre-agreed rate to the affiliate. A detailed MoU between NIAHS, Najafgarh and the concerned institution can govern the affiliation.

NIAHS will gain through expanded capacity and locus for practical, on-the-job training, e.g. Vardhman Manhavir Medical College may be an NIAHS affiliate and run courses on medical lab. Ram ManoharLohia (RML) hospital, New Delhi, JIPMER, Puducherry, CMC, Vellore, etc. may all be NIAHS affiliates.

Figure 17 Models of association with NIAHS/RIAHS



c) NIAHS satellite centres

Satellite centres will be private or public institutions where the low-end courses of NIAHS could be run. These should be institutions where undergraduate diploma courses will be run under the supervision of the NIAHS. No degree courses will be run at the satellite centres. These centres will linkup with NIAHS (Najafgarh or its off-site campus) or one of its affiliates for internships and on-the-job training.

A satellite centre may not receive any direct funding support from the NIAHS. It would only receive accreditation as a satellite centre after due verification and inspection. The satellite centre will gain legitimacy through the affiliation. NIAHS will gain capacity for low-end courses through such engagements, e.g. private institutions such as IPHH, Mahipalpur may be made into a NIAHS satellite centre and run diploma courses as governed by NIAHS.

The table in Annexure 8 delineates the potential for partnerships with existing reputed institutions offering various allied health courses across the country. It is important to note that this list is merely indicative and that the specific nature of each partnership with each institution will have to be worked out by the NIAHS Board.

One critical prerequisite of such collaboration will be the establishment of basic standards for each programme, including course curricula, nature of examinations/assessment, practical versus didactic teaching hours and hands-on experience via internships, all culminating in specific skills and competencies being checked prior to graduation.

d) Role of institutes affiliated with NIAHS and RIAHSs

NIAHS and RIAHSs will have the power to affiliate or recognise colleges and to withdraw such affiliation or recognition. The need for a new college is expected to be established on the basis of rational consideration by the Practice and Affiliation Management Committee. The affiliation of colleges must vest only with the Practice and Affiliation Management Committee and be given on academic grounds alone; no extraneous considerations should be allowed to come into play. Functions of such institutes are:

- Record-keeping and attendance
- Duty roster for various work stations
- Conduct of an adequate number of procedures as prescribed in the training guide issued by NIAHS
- Log book inspections
- Mid-term evaluation
- Evaluation of assignments
- Conduct of theory classes (special to stream)
- Maintenance of discipline and conduct
- Coordination of end-term evaluations.

Recommendation 5

NIAHS and RIAHS should be responsible for continuously evaluating the job potential and need for new courses and introducing, developing and promoting such courses across the nation.

Our analysis also reveals that, given the fast-paced growth in the healthcare sector, there is a potential for developing cadres of several new and emerging fields of AHPs.

As per the Cabinet note, 33 courses have been enlisted under the purview of the allied health streams, which were then bundled as indicated in Annexure 9. NIAHS secretariat undertook the task of identifying various other courses which come under the ambit of the allied health system. Some streams in which potential courses may be considered for roll-out in NIAHS and RIAHS (in addition to the proposed eleven streams) are as follows:

- Physiotherapy
- Occupational health

- Psychology and mental health counselling
- Dietetics and nutrition
- Physician assistance
- Respiratory care
- Home-based care/home aids
- Statistical assistance
- Hospital housekeeping/ front desk management
- General duty assistance
- Phlebotomy
- Technicians – ECG/EEG, ultrasonography, paramedic, dispensing optics, cath lab, blood bank, multi-rehabilitation worker, dark room assistant, CSSD, etc.

Based on all of the criteria above, the following courses may be prioritised for an immediate start-up plan at the national and regional levels. This will initially be done through the collaborative model (off-campus, affiliate or satellite) and eventually be rolled out through the regional and national institutes. The NIAHS will accord priority for all postgraduate and faculty development programmes, where applicable. Leveraging the existing capacity of 4,700 seats as mentioned above at Table 2, the list of priority courses is as follows:

i. Bachelor of Prosthetics and Orthotics

ii. Diploma in Orthotics and Prosthetics

iii. Bachelor of Rehabilitation Therapy

iv. Diploma in Community-based Rehabilitation

v. Bachelor in Physiotherapy

vi. Bachelor in Occupational Therapy

vii. Masters in Occupational Therapy

viii. Masters in Physiotherapy

ix. Diploma in Dental Hygienist

x. Diploma in Dental Mechanics

xi. Diploma in Medical Records Technology

xii. BSc in Medical Records and Health Information Technology

xiii. BSc Integrated Allied Health Sciences

xiv. Diploma in Dietetics and Human Nutrition

xv. PG Diploma in Dietetics and Human Nutrition

xvi. Diploma in Home Aid/Home-based care*

xvii. PG Diploma/BSc in Medical Counselling*

xviii. Certificate in Home-Based Care Provider*

* Note. These courses are currently not running under any centre of excellence, though there is a great need of these cadres within the healthcare delivery system. It is therefore imperative to start these courses at NIAHS/RIAHSs.

Recommendation 6

The capacity of public sector shoud be augmented through the provision of employment opportunities at the state and Central Government institutions by sanctioning new posts for the allied health cadre in the healthcare delivery system.

One of the important factors for the success of the allied health augmentation initiative across the nation is the ability of the public sector to attract and retain high-quality professionals in the system. As is evident from all our research, the best AHPs emerge out of a handful of national centres of excellence (as stated in the previous section), but a negligible percentage of those graduates actually end up working in the public sector, either as professionals or as faculty.

This necessitates the creation of specific posts across the public health system with clear job descriptions, market-based salaries and benefits and well-drawn-out career paths.

We compared each position to the latest norms as prescribed by the Indian Public Health Standards (2010) and recommended changes, where applicable, in order to meet the healthcare needs of the population. The summary is provided in Figure 18 below. The details are given in Annexure 10

BOX 11: Impact of Phlebotomy on Health Systems

Approximately 500 million samples are collected every year in India. Majority of these (~80%) are done using syringe and needle by personnel who have not been trained on safe and better practices. Studies have indicated that nearly 68% of all errors in laboratory testing are associated with the pre-analytical phase – phlebotomy (blood collection) being a major component of this phase[1].

The major pre-analytical errors associated with phlebotomy include hemolysis, improper clotting, transcriptional errors, insufficient volume to perform test, in adequate patient preparation, incorrect specimen collection time, overfilling/under filling of specimen collection vials, contamination etc. In fact studies have estimated that every minute:

1. 25,000 – 30,000 patient samples are hemolyzed thereby leading to seriously erroneous results.
2. 1500 samples have questionable identity.
3. 40 patients need to be re-bled due to insufficient sample volume.
4. About 30 patient samples get contaminated leading to generation of doubtful results.

The primary reasons behind the magnitude of errors and unsafe practices associated with pre-analytical phase are due to:

1. Extremely poor pre-analytical awareness.
2. Lack of phlebotomy training schools in the country.
3. Limited focus on phlebotomy as a discipline in medical technology and nursing schools with most of the learning being on-job.
4. Lack of standardized phlebotomy guidelines as part of curricula in medical and para-medical institutions across the country.

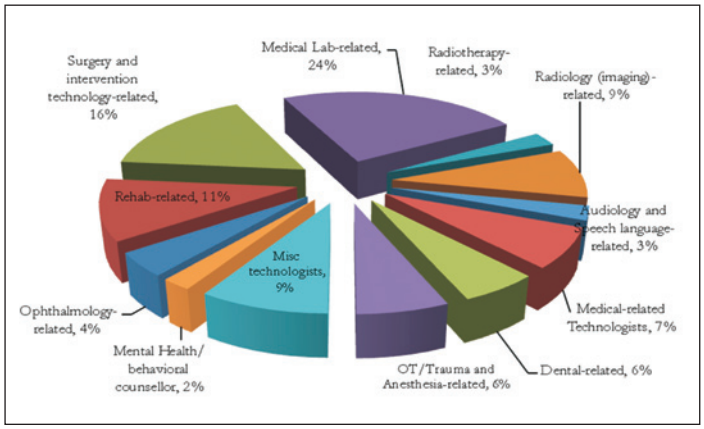
These professionals are important members of the health care team working with physicians, nurses, laboratory staff, and patients. Their primary role is to collect blood for accurate and reliable laboratory testing. This is usually accomplished by venipuncture or capillary collection. Training is designed to provide the student with the theory and hands-on skills required for phlebotomy. They must be skilled in the collection, transportation, and processing of laboratory specimens, customer service, and safety compliance.

The students of phlebotomy must also learn proper bedside manner which is extremely critical with exact training on patient care. A phlebotomist must show an exact mixture of skill and empathy.

Reference:

Plebani M, Carraro P. Mistakes in a stat laboratory: types and frequency. ClinChem 1997; 43:1348-51

Figure 18 Percentage of posts recommended to be sanctioned at all levels of the public healthcare delivery system



5. Conclusion

The widespread gaps in the availability of AHPs in India, as discussed in this chapter, are indicative of a critical shortfall of human resources for health in the system. Even by the most conservative estimates of AHPs per population norms, India has a massive gap in human resources that needs to be addressed on a priority basis.

As the government envisages providing universal access to healthcare in the country during the 12th Five-Year Plan period, the availability of skilled AHPs will emerge as the cornerstone to the success of India's public sector health reforms. Globally, studies conducted on human resources for health have underlined the need to invest in AHPs. This is critical to meet the current and future needs of healthcare in India.

There is an opportunity for academicians, government and researchers alike to contribute towards enhancing and extending the roles of AHPs by integrating them seamlessly within the healthcare delivery mechanism. As this chapter has established, plugging the gaps in the availability of the right numbers of trained AHPs will address the healthcare delivery challenges, especially in semi-urban and rural settings, at minimal costs.

Establishing national- and regional-level institutes dedicated to nurturing, training and retaining talent in the allied health space is imperative to get affordable and accessible healthcare within the reach of the common man.

Annexure 1

Sources for statistics on allied health professionals for calculation of the demand–supply imbalance

Category	Professionals	Source of numbers	
		Demand	**Supply**
Ophthalmology	Ophthalmologists	WHO SEARO targets + calculations per state	Presentation - Optometry in India by Mr. Rajesh Wadhwa
	Optometrists	Report – The Role of Optometry in Vision 2020	Census of India 2001 Report
Rehabilitation	Clinical psychologists, rehabilitation engineers and technicians, specialised teachers for education and training of the handicapped, vocational counsellors, employment officers and placement officers for the handicapped, multipurpose rehabilitation therapists, rehabilitation psychologists, rehabilitation social workers, rehabilitation practitioners in mental retardation, orientation and mobility specialists, community-based rehabilitation professionals, rehabilitation counsellors/ administrators, prosthetists and orthotists, rehabilitation workshop managers	IAMR Report on Projection of Human Resource Requirement in the Field of Rehabilitation of Persons with Disabilities	
Surgical and Intervention	Perfusion and cardiac care technologists	US Bureau of Labor Statistics	Estimates from supply data obtained
Medical Laboratory	Laboratory technicians	Report - Rural Healthcare system in India	
	Cytotechnicians	US Bureau of Labor Statistics	Estimates from supply data obtained
Radiology and Imaging	Radio diagnosis technicians	Report - Rural Healthcare system in India	
	Nuclear medicine technicians and radiotherapists	US Bureau of Labor Statistics	Estimates from supply data obtained

Audiology and speech language	Audiologists and speech therapists, speech pathologists, hearing aid and ear-mould technologists	IAMR Report on Projection of Human Resource Requirement in the Field of Rehabilitation of Persons with Disabilities	Estimates from supply data obtained
Medical	Dieticians	US Bureau of Labor Statistics	Census of India 2001 Report (table in introduction)
Dental	Dental technicians and dental hygienists	US Bureau of Labor Statistics	Estimates from supply data obtained
	Dental assistants	US bureau of labor statistics	Census of India 2001 report (table in intro)
Surgical and anaesthesia	Operation theatre technologists and pre-hospital trauma technologists	US Bureau of Labor Statistics	Estimates from supply data obtained
Miscellaneous	Public health educationists	US Bureau of Labor Statistics	Estimates from supply data obtained
	Sanitary inspectors	US Bureau of Labor Statistics	Estimates from supply data obtained
	Medical records/sanitary inspectors	Community pharmacy article on Wikipedia	Census of India 2001 Report (table in introduction)

Annexure 2

Indicative list of the various levels of qualification offered in each discipline

S. No	Discipline	Level of qualification						
		Apprentice	Certificate	Diploma	PG Diploma	Degree – UG	Degree – PG	Degree Post PG
1.	Burns & plastic surgery Technology			√				
2.	Anaesthesia Technology			√		√		
3.	Blood bank Technology		√	√				
4.	Cardiac care Technology			√		√	√	
5.	Cardiovascular & Thoracic Surgery		√	√		√		
6.	Community Based Rehabilitation			√				
7.	Central Sterile Supply Department			√				
8.	CT Scan Technology			√				
9.	Dental Hygiene			√				
10.	Dental Mechanics			√				
11.	Dialysis Technology			√		√		
12.	Endoscopic Technology			√				
13.	Hearing aid & ear mould Technology			√		√		
14.	Hearing Language & Speech Language			√		√	√	√
15.	Intensive Care Unit Technology			√				
16.	Medical Laboratory Technology	√	√	√	√	√	√	
17.	Medical Records Technology		√	√		√		
18.	MRI Technology			√				
19.	Neuro electro Physiology			√				
20.	Neuro Technology			√		√		
21.	Neurosurgery Technology			√				
22.	Operation Theatre Technology		√	√		√	√	
23.	Optometry & Refraction Technique			√		√	√	√
24.	Orthotics and Prosthetics			√		√		
25.	Physician Assistant			√		√		
26.	Physiotherapy & Occupational Therapy			√	√	√	√	
27.	Pre-hospital Trauma Technology		√	√				
28.	Radiography Technology & Imaging Technology		√	√		√	√	
29.	Radiotherapy			√		√	√	
30.	Respiratory Therapy			√		√		
31.	Sanitary/ health Inspectors	√	√	√				

S. No	Discipline	Level of qualification						
32.	Medical information Technology			√				
33.	Training young – deaf and hard Hearing			√				
34.	Cytotechnology				√			
35.	Hemato-technology				√			
36.	Histotechnology				√			
37.	Perfusion Technology				√	√	√	
38.	Clinical linguistic for Speech Language Pathology				√			
39.	Forensic speech Science & Technology				√			
40.	Healthcare Assistant		√		√			
41.	Medical Technology					√		
42.	Renal Dialysis					√		
43.	Blood Transfusion Technology					√	√	
44.	Public health Education and Promotion					√		
45.	Rehabilitation Therapy					√	√	
46.	Orthopaedic assistant & plaster Technique					√		
47.	Paramedical Technology					√		
48.	Nuclear Medicine Technology					√		
49.	Speech language Pathology						√	√
	Total	2	9	33	9	26	12	3

Annexure 3

Enhancement in the present number of allied health courses

S. No	Discipline	Number of Courses					Proposed number of students
		Cer	Dip	Deg	Yes	Total	
1.	ECG Technician	12	20	6	2	40	494
2.	CSSD Technician	9	18	3	2	32	421
3.	Emergency Medical Technician	2	19	9	0	30	509
4.	Dark Room Assistant	13	12	4	1	30	293
5.	Anaesthesia Technician	6	18	4	1	29	464
6.	ECHO Technician	7	15	6	1	29	348
7.	Ventilator Technician	7	12	5	1	25	426
8.	EEG/ Neurology lab Technician	6	14	5	0	25	307
9.	Dermatology/ STD/ Leprosy Technician	6	14	5	0	25	296
10.	Laundry Technician	8	9	4	2	23	329
11.	PFT Technician	10	9	1	2	22	247
12.	Bio-Medical Technician	7	10	4	0	21	286
13.	Nursing Orderly (NO)	5	11	1	2	19	406
14.	Ophthalmic Therapist	4	8	6	0	18	230
15.	Manifold Technician	7	8	2	0	17	240
16.	Forensic Technician	2	11	2	1	16	223
17.	Physician Assistant	3	8	3	1	15	300
18.	Chemotherapy Technician	3	5	2	0	10	111
19.	IVF & Reproductive Health Technician	2	5	0	0	7	100
20.	Public Health Engineering	1	1	4	0	6	114
21.	PET Scan Technician	1	2	1	0	4	54
22.	Organ Transplant Technician	0	3	1	0	4	33
23.	Nuclear Medicine Technician	1	1	1	0	3	39

[1]Institutes that are willing to start a new course in the discipline but have not specified the level

Annexure 5

GE analysis on shortfall of allied health workforce in India

Table 1: Ophthalmology

States	Ophthalmologists		Optometrists	
	Access-efficiency adjusted	Unadjusted	Access-efficiency adjusted	Unadjusted
Arunachal Pradesh	23	19	124	110
Assam	516	432	2749	2464
Bihar	1979	1885	10048	9728
Jharkhand	591	525	3062	2836
Manipur	44	35	238	204
Meghalaya	51	43	268	241
Mizoram	15	9	86	65
Nagaland	31	22	168	139
Odisha/Orissa	760	686	3925	3672
Sikkim	9	7	51	42
Tripura	68	65	349	338
West Bengal	1686	1556	8651	8208
Goa	26	24	135	129
Gujarat	1139	1073	5803	5579
Maharashtra	2060	1882	10597	9986
Andhra Pradesh	1457	1231	7660	6885
Karnataka	1060	908	5556	5036
Kerala	614	581	3155	3041
Tamil Nadu	1329	1232	6825	6495
Chhattisgarh	479	448	2446	2341
Delhi	335	334	1673	1672
Haryana	459	413	2370	2213
Himachal Pradesh	119	101	624	563
Jammu and Kashmir	229	208	1180	1107
Madhya Pradesh	1310	1174	6775	6311
Punjab	511	470	2622	2484
Rajasthan	1201	1036	6277	5713
Uttar Pradesh	3783	3590	19243	18586
Uttarakhand	179	157	932	855
Andaman & Nicobar	5	3	30	23
Chandigarh	21	20	104	103
Dadra and Nagar Haveli	6	5	31	29
Lakshadweep	1	1	6	5
Daman and Diu	5	5	24	23
Puducherry	25	25	124	123
India	22126	20207	113913	107351

Table 2: Rehabilitation

States	Clinical Psychologists		Rehabilitation Engineers and Technicians		Specialised. Teachers for Education and Training for the Handicapped		Vocational Counsellors, Employment Officers and Placement Officers for the Handicapped	
	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted
Arunachal Pradesh	3	3	1	1	1530	1496	871	871
Assam	68	58	30	22	34399	33675	854	839
Bihar	257	246	123	114	116824	116014	855	840
Jharkhand	77	69	36	30	36773	36201	860	849
Manipur	6	5	3	2	2998	2913	870	869
Meghalaya	7	6	3	2	3289	3219	871	869
Mizoram	2	1	1	0	1179	1125	871	870
Nagaland	4	3	2	1	2168	2096	870	869
Odisha/Orissa	99	91	46	39	46866	46223	859	846
Sikkim	1	1	1	0	664	642	872	871
Tripura	9	8	4	4	4116	4088	871	871
West Bengal	219	204	103	91	102321	101198	848	826
Goa	3	3	2	1	1626	1609	871	871
Gujarat	148	140	70	64	67850	67283	860	849
Maharashtra	268	248	126	109	125757	124207	840	810
Andhra Pradesh	191	165	86	65	93927	91961	832	793
Karnataka	139	121	63	49	67881	66562	844	818
Kerala	80	76	38	34	37382	37090	863	857
Tamil Nadu	173	162	81	72	80788	79949	853	836
Chhattisgarh	62	59	30	27	28676	28410	867	861
Delhi	43	43	21	21	18986	18983	872	872
Haryana	60	55	28	24	28320	27922	864	856
Himachal Pradesh	16	14	7	5	7615	7462	869	866
Jammu and Kashmir	30	27	14	12	14036	13851	868	865
Madhya Pradesh	171	155	79	67	81063	79886	848	825
Punjab	67	62	31	28	31028	30678	865	858
Rajasthan	157	138	72	57	76302	74871	843	815
Uttar Pradesh	491	469	234	217	224423	222755	836	804
Uttarakhand	23	21	11	9	11266	11071	868	864
Andaman & Nicobar	1	0	0	0	411	392	872	871
Chandigarh	3	3	1	1	1192	1190	872	872
Dadra and Nagar Haveli Haveli Haveli	1	1	0	0	381	374	872	872
Lakshadweep	0	0	0	0	71	70	872	872
Daman and Diu	1	1	0	0	274	273	872	872
Puducherry	3	3	2	2	1409	1408	872	872
India	**2884**	**2661**	**1347**	**1173**	**1353792**	**1337147**	**30166**	**29839**

Table 2: Rehabilitation cont'd

States	Multipurpose rehabilitation therapists		Rehabilitation Psychologists		Rehabilitation Social workers		Rehabilitation Practitioners in mental retardation	
	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted
Arunachal Pradesh	5	4	2360	2359	4505	4505	0	0
Assam	105	97	2337	2318	4488	4474	8	4
Bihar	377	368	2339	2318	4490	4474	36	32
Jharkhand	116	109	2345	2331	4494	4483	10	7
Manipur	9	8	2359	2357	4504	4503	1	0
Meghalaya	10	9	2359	2357	4505	4503	1	0
Mizoram	3	3	2359	2358	4505	4504	0	0
Nagaland	6	6	2359	2357	4504	4503	0	0
Odisha/Orissa	148	141	2343	2326	4493	4480	13	10
Sikkim	2	2	2360	2360	4506	4505	0	0
Tripura	13	13	2360	2359	4505	4505	1	1
West Bengal	326	313	2329	2300	4482	4460	30	24
Goa	5	5	2360	2360	4505	4505	0	0
Gujarat	218	211	2345	2331	4494	4483	21	18
Maharashtra	400	382	2319	2278	4474	4444	36	29
Andhra Pradesh	292	269	2308	2256	4466	4428	23	14
Karnataka	211	196	2324	2290	4479	4453	17	11
Kerala	119	116	2349	2341	4497	4491	11	9
Tamil Nadu	257	248	2335	2313	4487	4471	23	19
Chhattisgarh	92	89	2354	2347	4501	4495	9	7
Delhi	62	62	2361	2361	4506	4506	6	6
Haryana	90	85	2350	2340	4498	4490	8	6
Himachal Pradesh	24	22	2357	2353	4503	4500	2	1
Jammu and Kashmir	45	42	2356	2351	4502	4499	4	3
Madhya Pradesh	256	243	2329	2298	4482	4459	22	17
Punjab	99	95	2351	2342	4499	4492	9	7
Rajasthan	239	222	2322	2285	4477	4449	20	13
Uttar Pradesh	722	703	2314	2270	4471	4438	69	61
Uttarakhand	35	33	2356	2351	4502	4498	3	2
Andaman & Nicobar	1	1	2360	2360	4506	4505	0	0
Chandigarh	4	4	2361	2361	4506	4506	0	0
Dadra and Nagar Haveli	1	1	2361	2361	4506	4506	0	0
Lakshadweep	0	0	2361	2361	4506	4506	0	0
Daman and Diu	1	1	2361	2361	4506	4506	0	0
Puducherry	5	5	2361	2361	4506	4506	0	0
India	**4299**	**4109**	**82164**	**81730**	**157360**	**157036**	**384**	**305**

Table 2: Rehabilitation cont'd

States	Orientation and mobility specialists		Community based rehabilitation professionals		Rehabilitation counsellors/ administrators		Prosthetists and orthotists		Rehabilitation workshop managers	
	Access-Efficiency Adjusted	Unadjusted	Access-Efficiency Adjusted	Unadjusted	Access-Efficiency Adjusted	Unadjusted	Access-Efficiency Adjusted	Unadjusted	Access-Efficiency Adjusted	Unadjusted
Arunachal Pradesh	0	0	4119	4118	686	686	1	0	1125	1125
Assam	2	-2	4110	4103	681	677	31	6	1124	1123
Bihar	20	15	4111	4103	681	677	178	151	1124	1123
Jharkhand	4	1	4113	4108	683	680	45	26	1124	1124
Manipur	0	0	4118	4117	686	685	2	0	1125	1125
Meghalaya	0	0	4118	4118	686	685	3	1	1125	1125
Mizoram	0	0	4118	4118	686	685	0	-2	1125	1125
Nagaland	0	0	4118	4118	686	685	1	-1	1125	1125
Odisha/Orissa	6	3	4112	4106	682	679	60	39	1124	1123
Sikkim	0	0	4119	4119	686	686	0	0	1125	1125
Tripura	1	0	4119	4118	686	686	6	5	1125	1125
West Bengal	15	9	4107	4097	679	673	140	102	1124	1122
Goa	0	0	4119	4119	686	686	2	1	1125	1125
Gujarat	11	8	4113	4108	683	680	100	81	1124	1124
Maharashtra	18	9	4104	4089	677	668	169	117	1123	1121
Andhra Pradesh	9	-2	4100	4081	675	664	99	33	1123	1120
Karnataka	7	-1	4106	4093	678	671	74	30	1123	1122
Kerala	5	4	4115	4112	683	682	51	41	1124	1124
Tamil Nadu	12	7	4110	4102	681	676	110	82	1124	1123
Chhattisgarh	5	3	4116	4114	684	683	41	33	1125	1124
Delhi	4	4	4119	4119	686	686	33	33	1125	1125
Haryana	4	1	4115	4111	684	681	36	23	1125	1124
Himachal Pradesh	1	0	4118	4116	685	684	8	3	1125	1125
Jammu and Kashmir	2	1	4117	4115	685	684	19	12	1125	1125
Madhya Pradesh	10	4	4107	4096	679	673	103	63	1124	1122
Punjab	4	3	4115	4112	684	682	42	31	1125	1124
Rajasthan	8	0	4105	4091	678	670	86	38	1123	1121
Uttar Pradesh	37	28	4102	4086	676	667	335	279	1123	1121
Uttarakhand	1	0	4117	4115	685	684	13	7	1125	1125
Andaman & Nicobar	0	0	4119	4119	686	686	0	-1	1125	1125
Chandigarh	0	0	4119	4119	686	686	2	2	1125	1125
Dadra and Nagar Haveli	0	0	4119	4119	686	686	0	0	1125	1125
Lakshadweep	0	0	4119	4119	686	686	0	0	1125	1125
Daman and Diu	0	0	4119	4119	686	686	0	0	1125	1125
Puducherry	0	0	4119	4119	686	686	2	2	1125	1125
India	186	93	143994	143835	23910	23818	1797	1239	3354	39334

Table 3: Surgical and Intervention related technology

States	Perfusion technology		Cardiac care technology	
	Access-Efficiency Adjusted	Unadjusted	Access-Efficiency Adjusted	Unadjusted
Arunachal Pradesh	223	221	12	-4
Assam	5014	4973	257	-148
Bihar	16827	16781	1197	27
Jharkhand	5325	5293	330	10
Manipur	438	433	22	-8
Meghalaya	478	474	27	-6
Mizoram	174	171	5	-3
Nagaland	318	314	14	-14
Odisha/Orissa	6780	6744	432	-40
Sikkim	97	96	4	-5
Tripura	594	593	40	5
West Bengal	14780	14717	980	296
Goa	235	235	15	12
Gujarat	9782	9750	680	399
Maharashtra	18176	18088	1188	736
Andhra Pradesh	13647	13536	771	-17
Karnataka	9857	9783	566	117
Kerala	5401	5385	356	107
Tamil Nadu	11671	11624	771	535
Chhattisgarh	4136	4121	284	49
Delhi	2723	2723	397	213
Haryana	4098	4075	260	64
Himachal Pradesh	1106	1097	64	-30
Jammu and Kashmir	2029	2019	132	23
Madhya Pradesh	11732	11665	740	126
Punjab	4482	4462	297	130
Rajasthan	11071	10990	651	-32
Uttar Pradesh	32342	32247	2272	532
Uttarakhand	1633	1622	99	6
Andaman & Nicobar	61	60	2	-3
Chandigarh	171	171	23	13
Dadra and Nagar Haveli	55	55	3	0
Lakshadweep	10	10	1	0
Daman and Diu	39	39	3	2
Puducherry	202	202	16	14
India	**195710**	**194767**	**12908**	**3105**

Table 4: Medical Laboratory

States	Laboratory technician		Cytotechnician	
	Access-efficiency adjusted	Unadjusted	Access-efficiency adjusted	Unadjusted
Arunachal Pradesh	30	15	27	27
Assam	633	318	617	615
Bihar	3093	2741	2064	2062
Jharkhand	840	591	654	652
Manipur	53	16	54	54
Meghalaya	68	38	59	59
Mizoram	11	-12	22	21
Nagaland	32	1	39	39
Odisha/Orissa	1101	821	833	831
Sikkim	10	0	12	12
Tripura	103	90	73	73
West Bengal	2512	2023	1815	1811
Goa	37	30	29	29
Gujarat	1753	1506	1200	1198
Maharashtra	3039	2365	2232	2227
Andhra Pradesh	1932	1077	1679	1672
Karnataka	1422	849	1213	1208
Kerala	911	784	663	662
Tamil Nadu	1976	1611	1433	1430
Chhattisgarh	732	616	508	507
Delhi	556	555	334	334
Haryana	663	490	503	502
Himachal Pradesh	160	94	136	135
Jammu and Kashmir	336	256	249	249
Madhya Pradesh	1885	1373	1441	1437
Punjab	760	607	550	549
Rajasthan	1642	1019	1361	1356
Uttar Pradesh	5864	5138	3968	3963
Uttarakhand	249	164	201	200
Andaman & Nicobar	4	-4	7	7
Chandigarh	34	33	21	21
Dadra and Nagar Haveli	8	5	7	7
Lakshadweep	1	1	1	1
Daman and Diu	7	7	5	5
Puducherry	41	40	25	25
India	**32498**	**25257**	**24038**	**23981**

Table 5: Radiology and imaging related technology

States	Radio diagnosis		Nuclear medicine		Radiotherapist	
	Access-efficiency adjusted	Unadjusted	Access-efficiency adjusted	Unadjusted	Access-efficiency adjusted	Unadjusted
Arunachal Pradesh	21	19	2	2	-1	-3
Assam	466	433	48	46	-33	-77
Bihar	1677	1643	171	169	53	9
Jharkhand	512	488	53	51	-10	-41
Manipur	40	36	4	4	-4	-9
Meghalaya	45	42	5	4	-2	-6
Mizoram	15	12	2	1	-3	-6
Nagaland	28	25	3	3	-4	-8
Odisha/Orissa	656	630	67	65	-7	-42
Sikkim	9	8	1	1	-1	-3
Tripura	59	57	6	6	1	-1
West Bengal	1447	1399	148	144	8	-54
Goa	23	22	2	2	0	-1
Gujarat	969	945	99	97	22	-9
Maharashtra	1771	1707	182	176	-2	-86
Andhra Pradesh	1282	1201	133	126	-70	-176
Karnataka	931	876	96	92	-43	-116
Kerala	532	517	54	53	7	-13
Tamil Nadu	1144	1107	117	114	8	-40
Chhattisgarh	408	397	42	41	7	-7
Delhi	279	279	28	28	19	19
Haryana	396	380	41	39	-5	-26
Himachal Pradesh	104	98	11	10	-5	-13
Jammu and Kashmir	197	190	20	20	-1	-11
Madhya Pradesh	1132	1084	116	112	-16	-80
Punjab	438	424	45	44	2	-17
Rajasthan	1050	991	108	104	-42	-119
Uttar Pradesh	3214	3144	328	323	88	-4
Uttarakhand	156	148	16	15	-5	-15
Andaman & Nicobar	5	4	1	0	-1	-2
Chandigarh	17	17	2	2	1	1
Dadra and Nagar Haveli	5	5	1	1	0	-1
Lakshadweep	1	1	0	0	0	0
Daman and Diu	4	4	0	0	0	0
Puducherry	21	21	2	2	1	1
India	19053	18354	1956	1898	-38	-955

Table 6: Audiology and speech language

States	Audiologists and speech therapists		Speech pathologist		Hearing aid and ear mould technology	
	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted
Arunachal Pradesh	0	-3	6	6	3	3
Assam	-14	-77	135	133	64	61
Bihar	153	82	453	451	224	220
Jharkhand	20	-30	143	142	70	67
Manipur	-2	-9	12	12	6	5
Meghalaya	0	-6	13	13	6	6
Mizoram	-3	-7	5	5	2	2
Nagaland	-2	-9	9	8	4	4
Odisha/Orissa	32	-25	182	181	89	86
Sikkim	-1	-3	3	3	1	1
Tripura	4	2	16	16	8	8
West Bengal	92	-7	397	395	195	190
Goa	1	-1	6	6	3	3
Gujarat	80	30	263	262	130	127
Maharashtra	103	-33	489	485	239	233
Andhra Pradesh	5	-167	366	362	177	169
Karnataka	9	-106	265	262	128	123
Kerala	32	7	145	145	71	70
Tamil Nadu	71	-2	314	312	154	150
Chhattisgarh	32	8	111	111	55	54
Delhi	36	36	73	73	37	37
Haryana	19	-16	110	109	54	52
Himachal Pradesh	1	-12	30	29	14	14
Jammu and Kashmir	11	-5	55	54	27	26
Madhya Pradesh	51	-53	315	313	154	149
Punjab	28	-3	121	120	59	58
Rajasthan	20	-106	297	294	144	138
Uttar Pradesh	278	131	870	867	429	423
Uttarakhand	4	-13	44	43	21	21
Andaman & Nicobar	-1	-3	2	2	1	1
Chandigarh	2	2	5	5	2	2
Dadra and Nagar Haveli	0	-1	1	1	1	1
Lakshadweep	0	0	0	0	0	0
Daman and Diu	0	0	1	1	1	1
Puducherry	3	3	5	5	3	3
India	1065	-399	5261	5227	2575	2507

Table 7: Medical technology

	States	Dietician
	Access-Efficiency Adjusted	Unadjusted
Arunachal Pradesh	270	266
Assam	6076	6001
Bihar	20469	20385
Jharkhand	6467	6408
Manipur	530	521
Meghalaya	580	572
Mizoram	210	204
Nagaland	384	377
Odisha/Orissa	8236	8170
Sikkim	118	115
Tripura	722	719
West Bengal	17963	17847
Goa	286	284
Gujarat	11896	11837
Maharashtra	22085	21925
Andhra Pradesh	16555	16351
Karnataka	11959	11823
Kerala	6564	6534
Tamil Nadu	14184	14097
Chhattisgarh	5029	5002
Delhi	3317	3317
Haryana	4977	4936
Himachal Pradesh	1342	1326
Jammu and Kashmir	2466	2446
Madhya Pradesh	14249	14128
Punjab	5447	5411
Rajasthan	13436	13288
Uttar Pradesh	39336	39163
Uttarakhand	1983	1962
Andaman & Nicobar	73	71
Chandigarh	209	208
Dadra and Nagar Haveli	67	66
Lakshadweep	13	12
Daman and Diu	48	48
Puducherry	246	246
India	**237791**	**236070**

Table 8: Dental related technology

States	Dental technician		Dental assistant		Dental hygienist	
	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted
Arunachal Pradesh	207	205	1338	1335	789	787
Assam	4655	4614	30156	30101	17778	17745
Bihar	15633	15587	100604	100542	59312	59275
Jharkhand	4946	4913	31925	31881	18821	18795
Manipur	406	401	2633	2626	1552	1548
Meghalaya	444	440	2869	2864	1691	1688
Mizoram	162	158	1054	1049	621	619
Nagaland	295	291	1915	1909	1129	1126
Odisha/Orissa	6298	6261	40628	40578	23952	23922
Sikkim	90	89	587	586	346	345
Tripura	552	550	3557	3554	2097	2096
West Bengal	13730	13666	88494	88408	52172	52120
Goa	219	218	1412	1410	832	831
Gujarat	9088	9055	58513	58470	34497	34471
Maharashtra	16883	16795	108853	108735	64175	64103
Andhra Pradesh	12673	12561	81951	81800	48313	48223
Karnataka	9154	9079	59175	59074	34886	34825
Kerala	5017	5001	32343	32321	19068	19055
Tamil Nadu	10842	10794	69884	69820	41200	41162
Chhattisgarh	3843	3827	24747	24727	14590	14578
Delhi	2531	2530	16247	16246	9579	9578
Haryana	3806	3783	24555	24525	14476	14458
Himachal Pradesh	1027	1018	6637	6626	3913	3906
Jammu and Kashmir	1885	1874	12155	12141	7166	7158
Madhya Pradesh	10897	10830	70310	70220	41451	41397
Punjab	4164	4144	26838	26812	15823	15806
Rajasthan	10282	10200	66434	66324	39166	39100
Uttar Pradesh	30047	29952	193413	193285	114028	113951
Uttarakhand	1517	1506	9796	9781	5775	5766
Andaman & Nicobar	56	55	367	365	216	215
Chandigarh	159	159	1023	1022	603	603
Dadra and Nagar Haveli	51	51	332	331	196	195
Lakshadweep	10	10	62	62	37	37
Daman and Diu	37	37	235	235	139	139
Puducherry	188	188	1207	1207	711	711
India	**181792**	**180842**	**1172248**	**1170973**	**691103**	**690333**

Table 9: Surgical and anesthesia related technology

States	Operation theatre technology		Pre-hospital trauma technology	
	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted
Arunachal Pradesh	25	21	956	955
Assam	547	475	21551	21538
Bihar	2043	1963	71813	71798
Jharkhand	617	560	22800	22790
Manipur	47	39	1882	1880
Meghalaya	54	47	2050	2048
Mizoram	17	11	754	753
Nagaland	33	26	1369	1368
Odisha/Orissa	792	729	29013	29002
Sikkim	10	8	420	420
Tripura	71	68	2539	2539
West Bengal	1750	1640	63186	63166
Goa	27	26	1008	1008
Gujarat	1178	1122	41772	41762
Maharashtra	2142	1989	77727	77699
Andhra Pradesh	1533	1339	58548	58512
Karnataka	1113	983	42274	42250
Kerala	638	609	23094	23089
Tamil Nadu	1381	1298	49899	49884
Chhattisgarh	496	470	17668	17663
Delhi	343	342	11592	11592
Haryana	478	439	17536	17528
Himachal Pradesh	125	110	4742	4739
Jammu and Kashmir	238	220	8680	8676
Madhya Pradesh	1366	1250	50212	50190
Punjab	531	496	19163	19157
Rajasthan	1259	1118	47456	47430
Uttar Pradesh	3910	3745	138068	138038
Uttarakhand	187	168	6997	6993
Andaman & Nicobar	6	4	263	262
Chandigarh	21	21	730	730
Dadra and Nagar Haveli li	6	6	237	237
Lakshadweep	1	1	45	45
Daman and Diu	5	5	168	168
Puducherry	25	25	861	861
India	**23015**	**21374**	**837071**	**836769**

Table 10: Miscellaneous

States	Medical records		Public health education		Sanitary inspector	
	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted	Access–efficiency adjusted	Unadjusted
Arunachal Pradesh	785	782	300	300	-54	-229
Assam	17692	17626	6771	6767	-1674	-5392
Bihar	59127	59053	22563	22558	6047	1888
Jharkhand	18748	18695	7164	7160	238	-2699
Manipur	1544	1537	591	591	-176	-610
Meghalaya	1684	1678	644	644	-70	-425
Mizoram	617	612	237	237	-186	-467
Nagaland	1123	1116	430	430	-199	-567
Odisha/Orissa	23862	23803	9116	9112	683	-2618
Sikkim	344	342	132	132	-65	-181
Tripura	2090	2087	798	798	137	-11
West Bengal	51987	51885	19853	19846	2840	-2930
Goa	829	827	317	317	10	-75
Gujarat	34385	34333	13124	13121	2969	54
Maharashtra	63943	63801	24421	24413	2900	-5058
Andhra Pradesh	48102	47922	18395	18384	-2039	-12135
Karnataka	34736	34616	13282	13275	-1149	-7920
Kerala	19000	18973	7256	7254	950	-544
Tamil Nadu	41054	40977	15678	15673	2153	-2153
Chhattisgarh	14541	14517	5551	5550	1141	-224
Delhi	9555	9554	3642	3642	1651	1635
Haryana	14422	14385	5510	5507	386	-1658
Himachal Pradesh	3896	3882	1490	1489	-119	-906
Jammu and Kashmir	7140	7123	2727	2726	285	-666
Madhya Pradesh	41293	41186	15776	15770	944	-5099
Punjab	15767	15735	6021	6019	841	-960
Rajasthan	39002	38871	14910	14902	-757	-8106
Uttar Pradesh	113664	113512	43380	43371	10649	2084
Uttarakhand	5752	5734	2198	2197	-25	-1028
Andaman & Nicobar	215	213	82	82	-63	-161
Chandigarh	601	601	229	229	88	78
Dadra and Nagar Haveli	195	194	74	74	-4	-39
Lakshadweep	37	37	14	14	-2	-7
Daman and Diu	138	138	53	53	16	11
Puducherry	710	710	271	271	116	111
India	**688578**	**687059**	**263002**	**262908**	**28466**	**-57005**

Annexure 6

Original seat capacity based on Cabinet note

S.No	Zone / states	States	Population ('000) as on 1st March 2010*	Location of RIPS /No. of seats	No. of seats available as per population
1	**Hill Region and North**	Jammu & Kashmir	11568	Chandigarh (1,180)	155
2		Himachal Pradesh	6728		90
3		Haryana	25020		330
4		Punjab	27368		350
5		Chandigarh	1368		20
6		Delhi	17935		235
Zonetotal			**89987**		**1180**
7	**Uttar Pradesh & Uttarakhand**	Uttar Pradesh	197271	Lucknow (1,180)	1120
8		Uttarakhand	9800		60
10	**North Central**	Rajasthan	66750	Bhopal (1,180)	485
11		Madhya Pradesh	71050		520
12		Chattisgarh	23929		175
Zonetotal			**368800**		**2360**
13	**West**	Maharashtra	111118	Maharashtra (1,180)	755
14		Gujarat	58232		400
15		Goa	1714		15
16		Daman & Diu	259		5
17		Dadar& Nagar Haveli	337		5
Zonetotal			**171660**		**1180**
18	**AP & Karnataka**	Andhra Pradesh	83964	Hyderabad (1,180)	690
19		Karnataka	58804		490
20	South	Tamil Nadu	67012	Coimbatore (1,180)	765
21		Kerala	34317		390
22		Puducherry	1331		20
23		Lakshdweep	75		5
Zonetotal			**245503**		**2360**
24	**East**	West Bengal	88669	Bhubaneshwar (1,180)	800
25		Orissa	40389		375
26		Andaman & Nicobar Islands	480		5
27	**Bihar / Jharkhand**	Bihar	96389	Patna (1,180)	890
28		Jharkhand	31040		290
Zonetotal			**256967**		**2360**

S.No	Zone / states	States	Population ('000) as on 1st March 2010*	Location of RIPS /No. of seats	No. of seats available as per population
29	**North East**	Assam	30191	Aizawl(1180)	805
29		Meghalaya	2591		70
30		Manipur	2421		65
31		Tripura	3574		95
32		Mizoram	993		30
33		Nagaland	2223		60
34		Sikkim	605		20
35		Arunachal Pradesh	1227		35
Zonetotal			43825		1180
	All India	Total	1176742		10620
** Source: Census of India 2001 – Population Projection for India and States 2001–2026*					

Annexure 8

Possible partnerships for conducting the allied health courses

S.No	Course	Off campus	Affiliate	Satellite
		OPTOMETRY		
1	Bachelor of Optometry & Ophthalmic Technique	• Guru Nanak Eye Hospital, Delhi • Elite School of Optometry - Sankara Nethralaya, Chennai • L V Prasad Eye Institute	• Dr RP Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi • Vardaman Mahavir Medical College , Safdarjung Hospital , New Delhi • Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Puducherry • PGIMER, Chandigarh • Amrita Institute of Medical Sciences- Schools and Research Centres , Kerala • Birla Inst. Of Tech. & Sciences (BITS) , Pilani • Sri Ramachandra College of Allied Health Sciences, Chennai	• All India Institute of Optometrical Sciences, West Bengal • Nagar School of Optometry, Gujarat • Lotus college of Optometry, Maharashtra • Dr MGR Medical University , Tamil Nadu
2	Diploma in Optometry & Refraction Technique		• Dr RP Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi • Vardaman Mahavir Medical College , Safdarjung Hospital , New Delhi • Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Puducherry • PGIMER, Chandigarh • Amrita Institute of Medical Sciences- Schools and Research Centres , Kerala • Birla Inst. Of Tech. & Sciences (BITS) , Pilani • Sri Ramachandra College of Allied Health Sciences, Chennai	
3	Diploma in Ophthalmic Technician/ Ophthalmic Assistant	• Andhra Medical College, Andhra Pradesh • Gandhi Medical College, MP • Elite School of Optometry - Sankara Nethralaya, Chennai		
4	Certificate in Dispensing Optics	• Arvind Eye Hospital & PG Institute of Ophthalmology, Madurai • Elite School of Optometry - Sankara Nethralaya, Chennai		
5	Certificate in Contact Lens Training	• Elite School of Optometry - Sankara Nethralaya, Chennai		

S.No	Course	Off campus	Affiliate	Satellite
PROSTHETICS AND REHABILITATION				
6	Bachelor of Prosthetics & Orthotics	• All Indian Institute of Physical Medicine and Rehabilitation , Mumbai • Pt. DeendayalUpadhyay Institute for the Physically Handicapped	• National Institute for Orthopaedically Handicapped, West Bengal • Swami Vivekanand National Institute of Rehabilitation Training and Research , Orissa	• Government Prosthetics & Orthotics College, Gujarat
7	Bachelor of Rehabilitation Therapy	• Institute for the Physically Handicapped, New Delhi • N.I.M.H. Northern Regional Centre (NRC), New Delhi	• Spastic Society of Tamil Nadu, Chennai • Spastic Society of Northern India, New Delhi	• Holy Cross College, Tamil Nadu
8	Diploma in Community Based Rehabilitation (CBR)	• MANOVIKAS, Special School for Mentally Handicapped • Indian Institute of Cerebral Palsy, Kolkata	• Shanta Memorial Rehabilitation Centre, Bhubaneshwar	• Sri Ramakrishna Mission Vidyalaya, Coimbatore • Viklang Kendra Rural Research Society, Allahabad
9	Diploma in Orthotics and Prosthetics	• Christian Medical College(CMC) , Vellore • Govt Institute of Rehabilitation Medicine, Chennai	• Department of Rehabilitation, Safdarjung Hospital	• Schieffeline Leprosy Research and Training Centre, Vellore
10	Bachelor in Physiotherapy	• All Indian Institute of Physical Medicine and Rehabilitation , Mumbai • Pt. DeendayalUpadhyay Institute for the Physically Handicapped • JamiaHamdard Faculty of Medicine	• CMC, Nellore • Manipal College of Allied Health Sciences • Kasturba Medical College, Karnataka • Swami Vivekanand National Institute of Rehabilitation Training and Research , Orissa	• Amar Jyoti Institute of Physiotherapy • Institute Of Post Graduate Medical Education and Research , Kolkata • Dr MGR Medical University , Tamil Nadu
11	Masters in Physiotherapy	• JamiaHamdard Faculty of Medicine, New Delhi • Manipal College of Allied Health Sciences, Karnataka • Sri Ramachandra College of Physiotherapy, Chennai	• Padmashree Dr DY Patil College of Physiotherapy, Pune • MGM Institute of Health Sciences, Maharashtra	• Dr MGR Medical University, Tamil Nadu

S.No	Course	Off campus	Affiliate	Satellite
12	Bachelor in Occupational Therapy	• All Indian Institute of Physical Medicine and Rehabilitation, Mumbai • Christian Medical College, Vellore • Manipal College of Allied Health Sciences, Karnataka • PtDeendayalUpadhyay Institute for the Physically Handicapped , New Delhi	• National Institute for the Orthopaedically Handicapped, West Bengal • Swami Vivekanand National Institute of Rehabilitation Training and Research (SVNIRTAR), Orissa • King Edward Memorial Hospital and Seth GordhandasSunderdas Medical College – Mumbai	• Dr MGR Medical University, Tamil Nadu
13	Master in Occupational Therapy	• All Indian Institute of Physical Medicine and Rehabilitation , Mumbai • Manipal College of Allied Health Sciences, Karnataka • National Institute for the Orthopaedically Handicapped, West Bengal	• Swami Vivekanand National Institute of Rehabilitation Training and Research (SVNIRTAR), Orissa • King Edward Memorial Hospital and Seth GordhandasSunderdas Medical College, Mumbai	• LokmanyaTilak Municipal Medical College, Mumbai • Dr MGR Medical University, Tamil Nadu
CARDIOTHORACIC				
14	Diploma in Cardiac Care Technology	• Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala • Dr.K.R.Adhikary College of Optometry and Paramedical Technology, West Bengal	• Amrita Institute of Medical Sciences-Schools and Research Centres , Kerala • National Heart Institute, New Delhi • Fortis Escorts Heart Institutes and Research Centres • Apollo Group of Hospitals	• EMS Memorial Co-• EMS Memorial Co-operative Hospital and Research Centre, Perinthalmanna • Narayan Hrudayalaya Institute of Cardiac Sciences , Bengaluru
15	Bachelor in Cardio-pulmonary Perfusion Technology	• Narayan Hrudayalaya Institute of Cardiac Sciences, Bengaluru • Dr MGR Medical University, Tamil Nadu	• National Heart Institute, New Delhi • Fortis Escorts Heart Institutes and Research Centres • Amrita Institute of Medical Sciences-Schools and Research Centres, Kerala	• Apollo Group of Hospitals • Malabar Institute of Medical Sciences Ltd, Kerala

S.No	Course	Off campus	Affiliate	Satellite
16	BSc in Respiratory Technology	• Amrita Institute of Medical Sciences- Schools and Research Centres, Kerala • Manipal College of Allied Health Sciences, Karnataka	• Christian Medical College, Vellore • Nizam's Institute of Medical Sciences, Hyderabad	• Symbiosis Department of Health Sciences , Pune
MEDICAL LAB TECHNOLOGY				
17	MSc Medical Lab Technology	• Amrita Institute of Medical Sciences- Schools and Research Centres, Kerala • Manipal College of Allied Health Sciences, Karnataka • Sri Ramachandra College of Allied Health Sciences, Chennai	• Christian Medical College, Vellore • PGIMER, Chandigarh	• Birsa Institute of Technology (Trust), Ranchi • Dr MV Shetty College of Medical Laboratory Technology, Mangalore
18	Bachelor of Medical Lab Technology	• Christian Medical College, Vellore • PGIMER, Chandigarh • JIPMER , Puducherry • Dr MGR Medical University, Tamil Nadu	• Manipal College of Allied Health Sciences, Karnataka • Government Medical College, Chandigarh • Religare • Dr Lal Path Labs	• Birsa Institute of Technology (Trust), Ranchi • EMS Memorial Co-operative Hospital and Research Centre, Malappuram, Kerala • Asian Institute of Health Sciences, Maharashtra
19	Diploma in Medical Lab Technology	• Manipal College of Allied Health Sciences, Karnataka • Vardaman Mahavir Medical College, Safdarjung Hospital, New Delhi • Christian Medical College, Vellore • King Edward Memorial Hospital and Seth GordhandasSunderdas Medical College, Mumbai	• B J Medical College, Pune • JJ Hospital, Mumbai • Jaipur Golden Hospital, New Delhi • Narayan Hrudayalaya Institute of Cardiac Sciences, Bengaluru • BhartiyaVidyapeeth University, Pune	• Shri Mool Chand Kharaiti Ram Hospital, New Delhi • New Delhi Tuberculosis Centre, New Delhi
20	PG Diploma Histotechnology	• Christian Medical College, Vellore	• Maharashtra University of Health Sciences	• Ruxmaniben Deepchand Gardi Medical College, Ujjain • Apollo Institute of Hospital Management & Allied Sciences, Chennai
21	PG Diploma Cytotechnology	• Tata Memorial Hospital, Mumbai • Christian Medical College, Vellore	• Maharashtra University of Health Sciences	• Apollo Institute of Hospital Management & Allied Sciences, Chennai

S.No	Course	Off campus	Affiliate	Satellite
22	PG Diploma Hematotechnology	• PGIMER, Chandigarh	• Vardaman Mahavir Medical College , Safdarjung Hospital , New Delhi • King Edward Memorial Hospital and Seth GordhandasSunderdas Medical College, Mumbai	• Maharashtra University of Health Sciences • Apollo Institute of Hospital Management & Allied Sciences, Chennai
23	PG Diploma in Molecular Diagnostic Techniques	• Manipal university, Karnataka	• Centre for Genetics Disorders, Faculty of Science, Banaras Hindu University, Varanasi	• ApeejaySvran Institute For Biosciences & Clinical Research, Gurgaon • Bharathidasan University, Tiruchirappall, Tamil Nadu
RADIOGRAPHY & IMAGING TECHNOLOGY				
24	MSc Radiotherapy	• PGIMER, Chandigarh	• Amrita Institute of Medical Sciences-Schools and Research Centre , Kerala	• Christian Medical College, Ludhiyana • Chatrapati Shahuji Maharaj Medical University, Lucknow
25	Bachelor of Radiography & Imaging technology	• PGIMER, Chandigarh • AIIMS, New Delhi • Amrita Institute of Medical Sciences- Schools and Research Centres, Kerala • Dr MGR Medical University, Tamil Nadu	• University College of Medical Sciences and GTB Hospital, New Delhi • Nizam's Institute of Medical Sciences, Hyderabad	• St. Thomas Hospital, Kerala • Dr. B R Ambedkar Medical College Hospital, Karnataka
26	Bachelor of Radiotherapy Technology	• Dr MGR Medical University, Tamil Nadu • St.John`s National Academy of Health Sciences, Karnataka • JIPMER, Puducherry • PGIMER, Chandigarh	• Guru Gobind Singh Indraprastha University, New Delhi • AIIMS, New Delhi • CMC, Vellore • Rajeev Gandhi College, Bhopal	• Tripura Institute of Paramedical Sciences, Agartala • Symbiosis Department of Health Sciences, Pune • Dr NTR University of Health Sciences, Andhra Pradesh
27	Diploma in Radiography Technology & Imaging Technology	• Christian Medical College, Vellore • King Edward Memorial Hospital and Seth GordhandasSunderdas Medical College, Mumbai	• Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala • Nizam`s Institute of Medical Sciences, Hyderabad	• Apollo Institute of Hospital Management & Allied Sciences, Chennai

S.No	Course	Off campus	Affiliate	Satellite
27	Diploma in Radiography Technology & Imaging Technology	• Christian Medical College, Vellore • King Edward Memorial Hospital and Seth GordhandasSunderdas Medical College, Mumbai	• Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala • Nizam`s Institute of Medical Sciences, Hyderabad	• Apollo Institute of Hospital Management & Allied Sciences, Chennai
28	PG Diploma in Radiotherapy & Imaging technology	• Nizam`s Institute of Medical Sciences, Hyderabad • Apollo Institute of Hospital Management & Allied Sciences, Chennai	• Dr MGR Medical University , Tamil Nadu • Lokmanya Institute of Healthcare Technology, New Delhi	• Madurai Kamraj University, Tamil Nadu
AUDIOLOGY & SPEECH LANGUAGE PATHOLOGY				
29	Bachelor of Audiology & Speech Language Pathology	• All India Institute of Speech and Hearing (AIISH), Mysore • Ali Yavar Jung National Institute for the Hearing Handicapped (AYJNIHH), Mumbai • Kasturba Medical College, Manipal, Karnataka • Institute of Health Sciences, Orissa	• Sri Ramachandra College of Allied Health Sciences, Chennai • AWH Special College (Association for Welfare of the Handicapped Special College), Kozhikode (Kerala) • Dr MV Shetty College of Speech and Hearing, Mangalore (Karnataka) • CMC, Vellore • PGIMER, Chandigarh	• Holy Cross College, Tiruchirappalli (Tamil Nadu) • JM Institute of Speech and Hearing, Patna (Bihar) • Naseema Institute of Speech and Hearing (NAISH Institute), Bangalore (Karnataka) • Sweekar Rehabilitation Institute for Handicapped, Secunderabad (Andhra Pradesh)
30	Diploma in Hearing Aid and Ear Mould Technology	• All India Institute of Speech and Hearing (AIISH), Mysore	-	-
31	Diploma in Hearing Language & Speech	• Ali Yavar Jung National Institute for the Hearing Handicapped (AYJNIHH), Mumbai • National Institute for the Visually Handicapped Regional Centre, Chennai, Tamil Nadu	• Medical Trust Institute of Medical Sciences, Kochi (Kerala) • Dr S R Chandrasekhar Institute of Speech and Hearing (Dr SRCISH) Bangalore, Karnataka	• JM Institute of Speech and Hearing, Patna (Bihar) • Holy Cross College, Tiruchirappalli, Tamil Nadu

S.No	Course	Off campus	Affiliate	Satellite
		MEDICAL TECHNOLOGY		
32	Diploma in Dialysis Technology	• Apollo Institute of Hospital Management & Allied Sciences, Chennai • Amrita Institute of Medical Sciences- Schools and Research Centres(Amrita School of Medicine), Kerala	• Institute of Post Graduate Medical Education And Research (IPGMER), Kolkata • Manipal College of Allied Health Sciences, Karnataka • Sri Ramchandra Medical College, Chennai • Govt Medical College, Kozhikode	• Lissie Medical & Education Institute, Kochi • Govt Medical College, Thiruvananthapuram • Malabar Institute of Medical Sciences Ltd, Kerala • Symbiosis Institute Of Health Sciences (SIHS), Pune
33	Diploma in Neuro Electro Physiology	• Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala • Bangur Institute of Neurology, Kolkata	• CMC, Vellore • Amrita Institute of Medical Sciences- Schools And Research Centres(Amrita School of Medicine), Kerala • Sri Ramchandra Medical College, Chennai	• Rabindranath Tagore International Institute of Cardiac Sciences (RTIICS), Kolkata
		DENTAL		
34	Diploma in Dental Hygienist	• Dr DY Patil Dental College & Hospital, Mumbai and Pune • CMC, Vellore • King George Medical College, Lucknow	• Modern Dental College and Research Centre, Indore • Sardar Patel Institute of Dental and Medical Science, Lucknow	• Jaipur Dental College, Jaipur • Santosh Dental College, Ghaziabad • Faculty of Dental Sciences, Institute of Medical Sciences, BHU, Varanasi
35	Diploma in Dental Mechanic	• Dr D Y Patil Dental College & Hospital, Mumbai and Pune • Christian Dental College, Ludhiana • King George Medical College, Lucknow • Manipal College of Dental Sciences, Manipal	• Amrita School of Dentistry, Kerala • Modern Dental College And Research Centre, Indore • Sardar Patel Institute of Dental and Medical Science, Lucknow	• Jaipur Dental College, Jaipur • Santosh Dental College, Ghaziabad • Faculty of Dental Sciences, Institute of Medical Sciences, BHU, Varanasi • Seema Dental College, Rishikesh

S.No	Course	Off campus	Affiliate	Satellite
		EMERGENCY TRAUMA AND CRITICAL CARE		
36	Certificate course for Pre Hospital Trauma Technology/ Certificate course for Emergency Trauma and Critical Care Technology (ETCT)	• Government Medical College, Chandigarh • Vardaman Mahavir Medical College, Safdarjung Hospital, New Delhi	• Manipal College of Allied Health Sciences, Karnataka • CMC, Vellore • Sri Ramchandra Medical College, Chennai	• Apollo Institute of Hospital Management & Allied Sciences, Chennai • Department of Critical Care and Emergency Medicine, Sir Ganga Ram Hospital, New Delhi
37	Diploma in Pre Hospital Trauma Technology (PTT)/ Diploma in Emergency Trauma And Critical Care Technology (ETCT)	• Apollo Institute of Hospital Management & Allied Sciences, Chennai • Vardaman Mahavir Medical College, New Delhi • Dr. M G R University, Tamil Nadu	• Chettinad Academy of Research and Education (CARE), Kanchipuram • Symbiosis Institute of Health Sciences, Pune • Institute of Post Graduate Medical Education And Research (IPGMER), Kolkata	• Department of Critical Care and Emergency Medicine, Sir Ganga Ram Hospital, New Delhi • RG Kar Medical College, Kolkata
38	BSc in Critical Care Therapy	• CMC, Vellore • Sri Ramchandra Medical College, Chennai • Max Institute of Medical Excellence • School Of Emergency & Trauma Care BijuPatnaik Institute of Medical Science & Research, Orissa	• Nizam's Institute of Medical Sciences, Hyderabad • Department of Emergency and Trauma Care Management, Coimbatore (Tamil Nadu) • Madras Institute of Orthopaedics and Traumatology Academy of Allied Health Sciences, Chennai	• Rabindranath Tagore International Institute of Cardiac Sciences (RTIICS), Kolkata • Vinayak Mission University , Tamil Nadu
		OPERATION THEATRE		
39	Diploma in OT Technology	• Apollo Institute of Hospital Management & Allied Sciences, Chennai • Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala • The Sankara Nethralaya Academy, Chennai • NarayanaHrudayala Institute of Medical Sciences, Karnataka	• Max Institute of Medical Excellence, New Delhi • Lokmanya Institute of Healthcare Technology, New Delhi • Sri Ramachandra College of Allied Health Sciences, Chennai • Government Medical College, Kozhikode	• J & J Ethicon Institute of Surgical Education • Amrita Institute of Medical Sciences-Schools and Research Centres(Amrita School of Medicine), Kerala • PGIMER, Chandigarh • Malabar Institute of Medical Sciences, Calicut

S.No	Course	Off campus	Affiliate	Satellite
40	BSc in OT Technology	• Madras Institute of Orthopaedics and Traumatology Academy of Allied Health Sciences, Chennai • PGIMER, Chandigarh	• Government Medical College, Chandigarh • Rajiv Gandhi University of Health Sciences, Bengaluru • K S Hegde Medical Academy, Mangalore	• Amrita Institute of Medical Sciences-Schools and Research Centres(Amrita School of Medicine), Kerala • Apollo Institute of Hospital Management & Allied Sciences, Chennai
MISCELLANEOUS				
41	Diploma in Medical Records Technology	• Sree Chitra Tirunal Institute for Medical Sciences and Technology, Kerala • The Sankara Nethralaya Academy, Chennai • NarayanaHrudayala Institute of Medical Sciences, Karnataka	• Vardaman Mahavir Medical College, Safdarjung Hospital, New Delhi • Apollo Institute of Hospital Management & Allied Sciences, Chennai • JamiaHamdard University, New Delhi	• JIPMER, Puducherry • The Tamil Nadu Dr MGR Medical University , Tamil Nadu • Indraprastha Apollo Hospital, New Delhi • Mysore Medical College & Research Institute, Karnataka
42	Bachelor Public Health Education Promotion	• Gandhigram Institute of Rural & FW Trust, Tamil Nadu • Institute of Public Health, Bangalore	• National Institute of Health and Family Welfare, New Delhi • The Tamil Nadu Dr MGR Medical University, Tamil Nadu	• All India Institute of Hygiene and Public Health, West Bengal • Central Health Education Bureau, New Delhi
43	Diploma Sanitary Inspector	• All India Institute of Local Self-Governance, Mumbai • Industrial Training Institute, New Delhi	• Madhya Pradesh Paramedical Council • Mysore Medical College	

Annexure 9

Allied Health Course Bundling

SL No	Course	Duration
OPTOMETRY		
1.	Bachelor of Optometry & Ophthalmic Technique	3 years plus 6 months internship (semester system) + yearly exam
2.	Diploma in Optometry & Refraction Technique	2 years plus 6 months internship (yearly exam system)
PROSTHETICS AND REHABILITATION		
3.	Bachelor of Prosthetics & Orthotics	3 years plus 6 months internship (yearly exam system)
4.	Bachelor of Rehabilitation Therapy	4 years plus 6 months internship
5.	Diploma in Community Based Rehabilitation (CBR)	1 year plus 2–3 months internship (yearly exam system)
6.	Diploma in Orthotics and Prosthetics	2 years plus 6 months internship (yearly exam system)
SURGICAL & INTERVENTION TECHNOLOGY		
7	Bachelor of Cardio-pulmonary Perfusion Technology	3 years + 6 months internship (semester system)+ yearly exam
8	Diploma in Cardiac Care Technology	2 years + 6 months internship (semester system) + yearly exam
MEDICAL LAB TECHNOLOGY		
9	MSc Medical Lab Technology	2 years + 6 months internship (semester system) + yearly exam
10	Bachelor of Medical Lab Technology	3 years + 1 year internship (semester system) + yearly exam
11	Diploma in Medical Lab Technology	2 years + 6 months internship
12	PG Diploma Histotechnology	1 year + 6 months internship
13	PG Diploma Cytotechnology	1 year +6 months internship
14	PG Diploma Hematotechnology	1 year + 6 months internship
15	PG Diploma in Molecular Diagnostic Techniques	1 year + 6 months internship
RADIOGRAPHY & IMAGING TECHNOLOGY		
16	MSc Radiotherapy	2 years + yearly exam system
17	Bachelor of Radiography & Imaging Technology	3 years Semester system+ yearly exam+ 6 months internship
18	Bachelor of Radiotherapy Technology	3 years (6 months internship)(yearly exam system)
19	Diploma in Radiography Technology & Imaging Technology	2 years (yearly exam system) 6 months internship
20	PG Diploma in Radiotherapy & Imaging Technology	2 years, yearly exam system+ 6 months internship
AUDIOLOGY & SPEECH LANGUAGE PATHOLOGY		
21	Bachelor of Audiology & Speech language Pathology	3 years + 6 months internship (yearly exam system)
22	Diploma in Hearing Aid and Ear Mould Technology	1 year
23	Diploma in Hearing Language & Speech	1 year yearly exam system
MEDICAL TECHNOLOGY		
24	Diploma in Dialysis Technology	2 years + 6 months internship (yearly exam system)
25.	Diploma in Neuro Electro Physiology	2 years + 6 months internship

SL No	Course	Duration
	DENTAL	
26	Diploma in Dental Hygienist	2 years + yearly exam system
27	Diploma in Dental Mechanic	2 years + yearly exam system
	SURGERY AND ANAESTHESIA	
28	Diploma in OT Technology	2 years, 6 months internship
29	Diploma in pre hospital trauma technology (PTT)	2 years semester system with 6 months internship + yearly exam
30	Certificate Course for Pre Hospital Trauma Technology	9 months 3 months internship + yearly exam
	MISCELLANEOUS	
31	Diploma in Medical Records Technology	2 years course, 6 months internship
32	Bachelor Public Health Education Promotion	3 years
33	Diploma Sanitary Inspectors	2 years (yearly exam system)

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Chapter 4

Standardising Allied Health Education

Chapter 4

Standardising Allied Health Education

1. Introduction

The education system in allied health has dramatically evolved over the years. Recent advances in technology are also driving the need for allied health educators to become well versed with content-specific applied pedagogical concepts. There have been changes in the methods of instruction, processes of assessment, class size and methods for preparation of class lectures. These, coupled with lack of incentives for the faculty, may result in faculty members themselves being the primary barrier to change. In 2009, the World Health Organization (WHO) report on the health workforce underscored the importance of standardised formal education in reforming healthcare delivery in developing countries.[1]

A literature review indicates that many associated factors drive the sustainability of institutions imparting higher education within the healthcare system. Some of them are listed below:

i. The market

- A growing number of single- and multi-superspecialty tertiary-care hospitals
- Rapid expansion of hospitals and medical colleges all over India
- Emerging technologies and development in medical services such as emergency medicine, clinical waste management to name a few, will generate specific educational requirements, i.e. education and training for allied health personnel.

ii. Customer expectations of quality healthcare services

- To bridge the gap, specialists in the allied health sciences will become vital as the number of single- and multi-superspecialty hospitals increases.
- The necessary competencies required out of graduates become explicit when the framework for qualification and competence is defined and made official.

Most of the successful models in the education system are derived from the industrial concept and thus they also give rise to alternate models of business generation, which is essential for the long-term sustainability of institutes.

Over a period of ten months, the National Initiative for Allied Health Sciences (NIAHS) secretariat attempted to catalogue discrepancies in the formal education imparted to aspiring allied health professionals (AHPs) by a literature review spanning over more than 180 peer-reviewed publications. The review indicates several lacunae in the present education system.

In India, regulation of higher education is fragmented, and done by several agencies. Higher education falls within the jurisdiction of the University Grants Commission (UGC) and professional institutions are coordinated by the All India Council for Technical Education (AICTE). Allied health education is, at present, outside the ambit of regulatory bodies.

Over the years, the allied health professionals experienced a transition from on-the-job training to education in formal institutions such as colleges and university settings, which led to the mushrooming of such colleges across the nation. Many allied health fields instituted additional and better training, and have adopted educational requirements that include formal academic degrees, although the entire system lacks standardisation. The literature review indicates

that content and revision of curricula has been sporadic and the standard of education imparted has remained unmonitored. The training and teaching methods across medical colleges excludes non-medical public health strategies and does not factor in the latest technological advances in medicine. Furthermore, no scientific study has been undertaken to determine the exact numbers of service providers, teachers and researchers that are required.[2]

There is also a marked difference between the public and private sectors with respect to the training offered in various allied health courses, as well as the content of these courses. The private sector has traditionally placed emphasis on revenue-producing courses and those with a shorter duration, while public sector institutions often provide hospital-oriented courses on a need basis. There is a lack of standardised evidence-based training. Most universities have their own training programmes, which have been fashioned on the need expressed by the health sector, mainly hospitals. There are very few opportunities for higher education in these fields and career paths are poorly defined. The quality of the graduating students depends largely on the entry-level qualification, type of course delivery, exposure to practical work, faculty, culture of the training organisation and system of examination.

In the absence of a regulatory framework, non-standardised curricula and indiscriminate awarding of degrees have emerged as major impediments to students seeking to pursue higher studies, according to a recent Confederation of Indian Industry (CII) study (conducted by Technopak).[3] The ripple effect of this ad-hoc education system makes it difficult for the health sector to recruit a quality workforce with uniform skills, leaving fresh crops of graduates to fend for themselves or learn skills on-the-job. Thus, a standardised course is required to equip professionals with knowledge and skills before they are inducted into the workforce.

BOX 1: Findings of the CII study by Technopak

- The absence of uniform standards and quality control mechanisms in paramedical (allied health) practice has led to an inappropriate mix of health personnel.
- Mechanisms for the exchange of information on paramedical (allied health) education and training are lacking.
- Ethics and standards are neither enforced nor uniform. Inadequate attention is given to the development of technical expertise and soft skills. These roadblocks have led to a paramedical (allied health) workforce with a varied perspective and understanding of their individual roles in a healthcare set-up, which thereby poses a major challenge in maintaining a quality and effective healthcare delivery environment.
- No specific data are available on the number of allied health workers as there is no council.
- Technopak estimates an immediate requirement of an additional 2,64,500 paramedics in the country to meet the backlog and match the current global average of at least three paramedics (laboratory health workers) per 10,000 persons. There is an approximate requirement of a 10-fold increase in the current output, which can be met both by increasing the capacity of current institutions and by setting up new ones.[3]

2. Current state of educational framework in allied health sciences

The NIAHS secretariat, instituted by the Ministry of Health and Family Welfare, is one of the first *formalised* attempts by the Government of India to understand the challenges plaguing this sector and develop a strategic framework to augment the allied health capacity in India. Our research on allied health system, including a primary survey conducted via facility walk-throughs and in-depth stakeholder consultations, indicates the following finding in Table 1.

Table 1: Situation analysis of allied health education system

S.No.	Components	PGI (Ch)	Safdarjung	KEM	IPHH	EISE(J&J)	AIIPMR	AYJNIHH	MCOAHS	CMC-Vellore	SCTIMST	GMC-(Ch)	JJ Hospital	SRU
1	**Infrastructure**													
	Attachment with hospital /skills lab	√	√	√	√	√	√	√	√	√	√	√	√	√
	Separate infrastructure for allied health courses	×	×	×	√	√	√	√	√	√	√	√	×	√
	Separate demo lab	√	×	√	√	√	√	√	√	√	√	-	-	√
	Live registers	×	×	×	×	×	×	×	×	×	×	×	×	×
2	**Inputs**													
	Defined admission criteria	√	√	√	√	-	√	√	√	√	√	-	√	√
	Defined intake capacity	-	√	√	×	-	√	√	√	√	√	-	√	√
	Defined career pathways	×	×	×	×	×	×	×	×	×	×	×	×	×
	Standardised curricula	√	√	√	√	√	√	√	√	√	√	√	√	√
	Curricula upgradation	√	√	√	√	√	√	√	√	√	√	√	√	√
	Standardised training duration (internship)	√	√	√	√	√	√	√	√	√	√	√	√	√
	Technology-based mode of teaching	√	√	√	√	√	√	√	√	√	√	√	√	√
	Use of simulators	×	×	×	×		√	√	√	√	×	×	×	×
	Skills assessment	-	×	-	×	-	√	√	√	×	×	-	-	-
	Dedicated placement cell	-	-	-	-	-	-	-	×	×	×	-	-	-

S.No.	Components	PGI (Ch)	Safdarjung	KEM	IPHH	EISE(J&J)	AIIPMR	AYJNIHH	MCOAHS	CMC-Vellore	SCTIMST	GMC-(Ch)	JJ Hospital	SRU
3	**Faculty**													
	Defined qualification for faculty	-	√	×	√	-	√	√	√	-	-	-	-	√
	Dedicated faculty (AH specialists)	√	×	×	√	√	√	√	√	√	×	×	-	√
	Common faculty (medical)	√	√	√	√	-	×	×	√	√	√	-	√	×
	Assessment of teaching competence	×	×	×	×	√	×	-	√	√	-	-	×	√
	Defined guidelines for promotion (AH faculty)	×	×	√	×	×	×	√	√	√	-	-	×	√
	Faculty development programme	×	√	√	×	×	√	√	√	√	-	×	-	√
4	**Regulation and management**													
	Accreditation of institution	×	×	×	×	√	-	-	×	×	×	-	×	√
	Certified courses	√	√	√	√	√	√	√	√	√	√	√	√	√
	Quality assurance protocols	×	×	×	×	√	×	×	√	-	-	-	-	√
	Registration and licensing	×	×	×	√	×	×	×	×	-	×	×	×	-
	Central funding	√	√	-	-	-	√	√	-	√	√	√	×	-
	State funding	×	×	√	-	-	-	-	-	×	-	×	√	-
	Private funding	-	-	-	√	√	-	-	√	-	-	-	-	-
	Autonomous	√	×	×	×	×	√	√	×	√	√	√	×	×
	State controlled	×	√	√	√	√	×	×	√	×	×	×	√	×

The literature search and field visits also indicate that there are two streams of education in India; well-established private institutes offering high-quality as well as expensive education; and a vast number of publicly financed institutes run by local authorities, most of which offer affordable education and hence the indifferent quality. Private institutes suit urban candidates, whereas publicly financed institutes remain the only option for both the urban and rural poor, irrespective of the capability and calibre of potential students. This divide in the access to education has serious implications on the overall social development of the country.

The success of the stand-alone models of excellence, such as Indian Institutes of Technology (IITs), Indian Institutes of Management (IIMs), Indian Institute of Science (IISc), is associated with the determination to provide exceptionally high-quality education to

the candidates. They have the advantage of being associated with premier institutes; for example, four out of five IITs in the 1950s were set up in collaboration with the institutes in major industrialised nations such as the USA, Germany, Russia and the UK, which enabled them to absorb the best teaching methods, curriculum offerings, experiences and practices across the world. This exposure ensures that their programmes are relevant to the need of the global economy and are of a quality that is comparable with the best at the international level.

However, the situation is gloomy when it comes to the allied health institutes catering to the masses. These are marked by indifferent quality, unrevised curriculum contents and poor practices. The inadequacy or underutilisation of resources such as trained faculty and infrastructure are hindrances in the pathway of reforms. Infrastructure such as laboratories and high-end technologies still remain underutilised due to multiple reasons in many institutions. Most of the budget for higher education is spent on salaries alone, which makes it mandatory to utilise the human resource effectively. The majority of students completing their education in these establishments either end up unemployed or else are under qualified as per the criteria of the job. This implies the existence of huge gap between education and employment in India. Moreover, the resistance to change and limited freedom to innovate has been an issue in the academic fraternity, though with the advent of the concept of the autonomous institutes, this issue has been rectified to an extent.

Based on the literature review and findings from the field visits enumerated in Table 1, this chapter identifies the following areas for consideration related to the allied health educational framework:

a) Plethora of allied health courses

b) Management and autonomy of institutes running such courses

c) Curricula and skills-based training methodology

d) Importance of attachment to a tertiary-care training facility

e) Faculty shortages and development

Marked differences were found in the duration of courses offered and the work environment at hospitals in rural and urban settings. Most of the courses have been initiated on a 'need basis' for better employability of students and for developing faculty.

As per the statistics from the human resource department of the Ministry of Health and Family Welfare (MoHFW), presently there are 355 medical colleges (161 government and 194 private) providing undergraduate and postgraduate training in India. As per the Medical Council of India (MCI)'s Postgraduate Medical Education Regulations of the year 2000,[4] postgraduate courses require extra staff in the departments of anatomy, physiology, biochemistry, pharmacology, pathology, microbiology, community medicine, radiodiagnosis, radiotherapy, anaesthesia and forensic medicine (four additional teaching faculty in each of these departments, in addition to those required for undergraduate education). In most medical colleges, doctors teach allied health sciences while very few allied health staff are involved in actual teaching. The paucity of qualified allied health specialists overburdens the medical fraternity. This creates a behavioural problem since doctors have been seen to have a patronizing attitude towards AHPs.

a) Plethora of allied health courses

There are innumerable allied health courses, ranging from short term (up to 3–6 months) to certificate, diploma, graduate and postgraduate diplomas, postgraduate degree or doctorate level. There are two problems concerning the grouping of such occupations into meaningful categories—standardisation of occupational titles and the classification of occupations.

The literature review indicates that the nomenclature differs for similar courses across the country. Various professions defined by different sources have been compiled and delineated in Appendix-1. A list of 139 courses of existing, emerging and essential cadres in the Indian healthcare system has also been compiled by NIAHS Secretariat, which

may be revised as more professions emerge in the near future, spanning diagnostic, curative, non-direct care, rehabilitative and community-based care. The details are delineated in Appendix-2

The absence of a defined role of an AHP in the Indian healthcare setting makes it imperative to understand the specific job description, competencies and skills required, career opportunities and associated details pertaining to each allied health cadre. In view of this, NIAHS secretariat undertook an international review of the various professions under the allied health ambit.

Table 2 indicates the 28 professions and professionals listed by the US Department of Labour. A detailed description of all the professions is given in Appendix-3.

The allied health profession may be uniquely placed to work across the boundaries of health and social care – and indeed more widely – to ensure an integrated service to patients and service users.[5]
The literature review indicates that some universities such as the Sri Ramachandra University (SRU) and Maharashtra University of Health Sciences (MUHS) have taken a step ahead to introduce an integrated course to serve the need of the population. Various courses conducted by the identified centres of excellences are givenin Appendix-4.

Most of the degree and postgraduate courses were started for better employability of the students and for developing trained faculty. Some institutions expose the students to a wide range of experiences, from the most modern hospitals to small hospitals in remote areas to settings like rural region. Thus, the students are able to work in basic hospitals and in advanced facilities, in urban as well as rural conditions. Graduates thus work in a wide range of settings, including public and private hospitals, trauma centres, diagnostic centres, rehabilitation centres, community health settings, community home-care services, residential aged-care facilities, to name a few.

b) Management and autonomy of allied health colleges

Higher education worldwide achieves higher efficiency gains by increasing institutional autonomy and accountability for institutions imparting such courses. The literature search also highlighted the importance of autonomy for developing world class universities and innovations.[6]Autonomous bodies are set up whenever it is felt that certain functions need to be discharged outside the governmental set-up with some amount of independence and flexibility, and without day-to-day interference of the governmental machinery. These are set up by the ministries/ departments concerned with the subject matter and are funded through grants-in-aid, either fully or partially, depending on the extent to which such institutes generate internal resources of their own. These grants are regulated by the Ministry of Finance through their instructions as well as the instructions relating to powers for creation of posts. They are mostly registered as societies under the Societies Registration Act and, in certain cases, they have been set up as statutory institutions under the provisions contained in various Acts.[7]

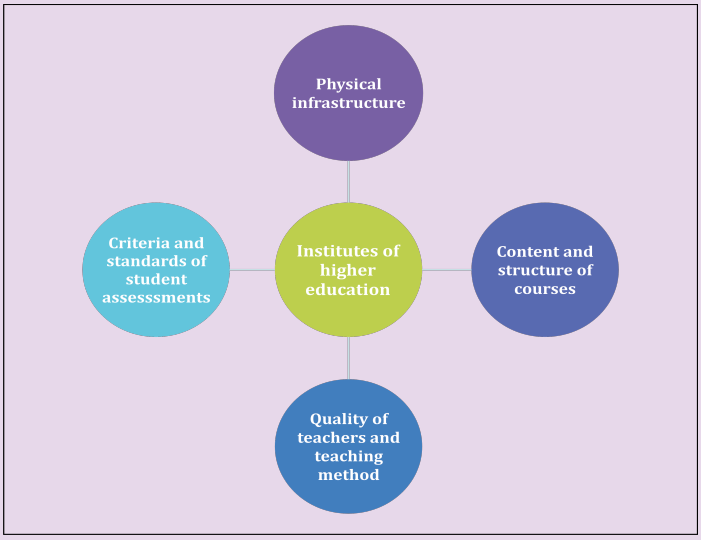
The UGC document on the XI Plan profile of higher education in India clearly states that

'The only safe and better way to improve the quality of undergraduate education is to delink most of the colleges from the affiliating structure. Colleges with academic and operative freedom are doing better and have more credibility. The financial support to such colleges boosts the concept of autonomy.'[8]

BOX 2: Role of central and state governments

In India, presently there are 16,885 colleges of higher education with 9.954 million students enrolled for various courses offered by the Indian education system. The central government sets standards for higher education and research institutes, and ensures that they are maintained and followed. It is also accountable for regulating all the components of higher education. State governments are responsible for creating facilities for the establishment of institutions, maintenance of established units and ensuring that higher education is accessible to all. The education department of the state government is responsible for the administrative functions associated with the universities in the concerned states (Figure 1).[9]

Figure 1: Components of standards for the higher education system in India



Along with running traditional courses, one of the significant things that most autonomous colleges have done is the introduction of new courses, which are in demand in the employment market. Autonomy allows the freedom required to decide the own course of action, be it admissions, curriculum, hiring of faculty, starting new programmes or closing old programmes, and so on by the institute. Of course, autonomy can only be in conjunction with accountability, where performance assessment can be done in line with norms followed by set guidelines of the higher academic authority. Briefly, institute has the right to decide what to teach, how to teach and whom to teach. Such 'autonomous bodies', 'university-level institutions', or even simply 'other central institutions' exist in the present education system of our country. Many of them are designated as Institutes of National Importance (INI) and set by an act of Parliament. They receive special recognition and funding. The Department of Higher Education's list includes 39 such institutions[10]. Details of INI(s) are given in Appendix-5.

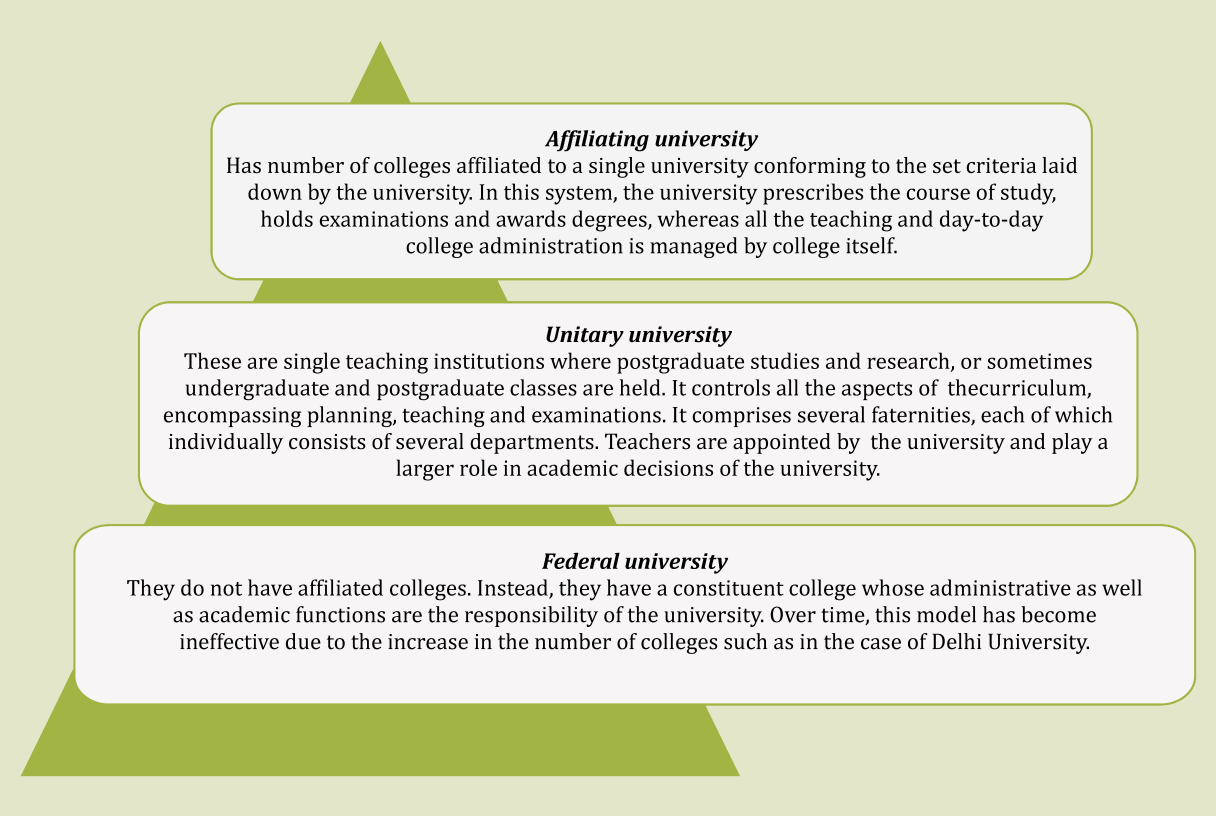
BOX 3: Structure of universities

The typical pattern of a university in India is that of universities funded by state governments and supported by the central government for developmental programmes through the UGC or AICTE. The other types of universities in the existing education system are the central university; unitary, federal and affiliated university; institute of national importance, deemed university and open universities. Institutes of higher education comprise unidisciplinary and multidisciplinary universities, and institutes of national importance include those such as AIIMS, Indian Institutes of Management (IIMs) and others.

Others include deemed universities such as Birla Institute of Technology and Science (BITS), Indian Institute of Science (IISc) and specialised universities. There has been considerable growth of the university system in the country since the Independence, with the number of universities increasing from 18 in the year 1947 to nearly 300 now.[11]

Universities of higher education in India fall under the following categories on the basis of their structural patterns (Figure 2).

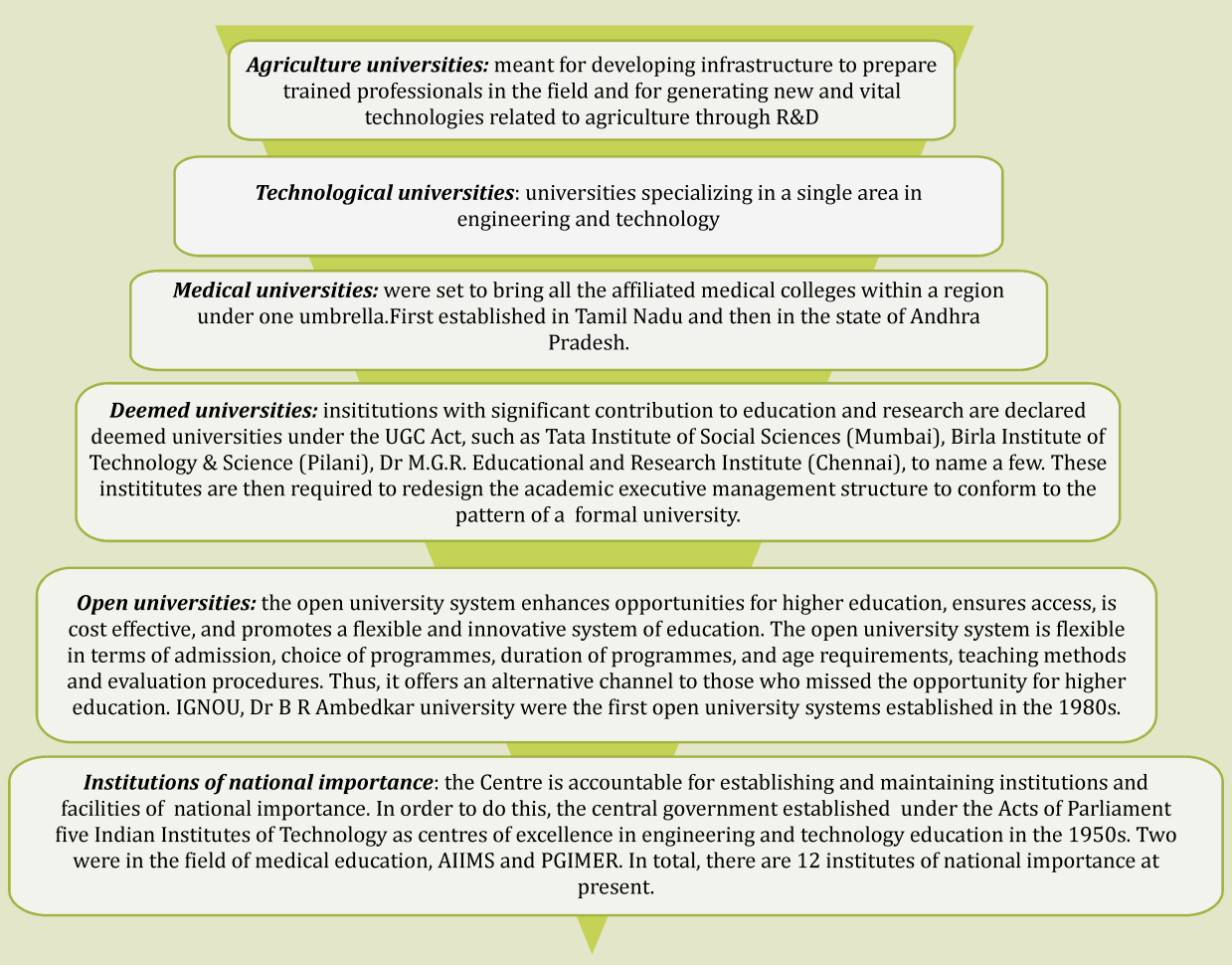
Figure 2: Type of universities on the basis of structural pattern



Source: Pillai C R , Murthy CRK, Sagar M, Ramanujam PR, Sudha Rao K. Management of higher education: institutional level. IGNOU [Internet]. 2008 Oct 7.

Universities can be further categorised according to their roles and functions. Figure 3 below depicts the various types of universities categorised on the basis of their functions and roles.

Figure 3: Types of universities on the basis of their functions



Source: Pillai C R , Murthy CRK, Sagar M, Ramanujam PR, Sudha Rao K. Management of higher education: institutional level. IGNOU [Internet]. 2008 Oct 7.

i. Management of institutes

Field visits and the literature review indicate that many institute management models exist across the country, some of which are given below:

- **Medical colleges conducting certain courses utilizing their existing infrastructure and capacity in some of the departments, without a formal structure of a separate college or institution within their system:**

In this model, medical colleges or some departments such as laboratory, radiodiagnosis, operation theatre, dental department, etc. conduct certificate/ diploma courses (six months to two years) offered by the college. All private medical colleges and a number of state medical colleges fall under this category. The courses are directed by the respective department heads and there is no formal institutional structure dedicated to allied health education. In some cases, it was noticed that a separate entity has been showcased for allied health courses, but the organogram is skeletal and the faculty are part-time office bearers from the main medical college. The advantage in this model is that some surplus capacity is utilised for allied health education. The disadvantages are that quality checks are not in place, the growth and development of the

discipline remains undetermined and the entire education is designed to produce people with just enough skills to assist the physicians at minimum cost. e.g. G.S. Medical College, Mumbai.

- **Multispecialty and superspecialty private hospitals conducting specific courses:**

This model mostly revolves around the agenda of getting additional working hands in the hospital, and also serves as a source of revenue. The faculty is mostly part time. The quality of the courses varies, with some of the bigger corporate hospitals producing better-quality technicians. These courses usually offer certificates or diplomas from the hospital. Since there are no regulatory frameworks in most of the states, the courses are autonomously run and managed, e.g. Apollo Hospitals Education and Research Foundation.

- **Stand-alone allied health academies, utilizing the hospital and medical college infrastructure through MoUs or informal arrangements:**

These institutes have been in existence for more than two decades and, over the years, have developed the reputation of being pioneers in the field. They mostly produce personnel in the diagnostic fields such as laboratory technicians and radiographers. A certain percentage of people are trained in operating machines, such as those for ECG, EEG, cardiopulmonary machines, CT scan, MRI, haemodialysis, and so on. They have in fact been filling up the demand as per their own needs in their own way; e.g. Sardar Bhagwan Singh Post Graduate Institute of Biomedical Sciences & Research, Dehradun.

- **Stand-alone academies having no associated hospital or medical college:**

These are small institutions in large and small towns, which mostly produce people in streams such as laboratory technicians, radiographers, sanitary inspectors, etc. The educational infrastructure is skeletal and many have tie-ups with private hospitals for on-the-job training, which is again without any formal structure, e.g Institute of Public Health and Hygiene, New Delhi.

- **Distance-learning mode with attached programme study centres in large institutions, as run by national open schools such as the Indira Gandhi National Open University (IGNOU):**

In this model, the course is well defined, and the practical training and contact programmes are conducted in a proper manner in reputed institutions. At the end of the course, a degree or diploma is offered.

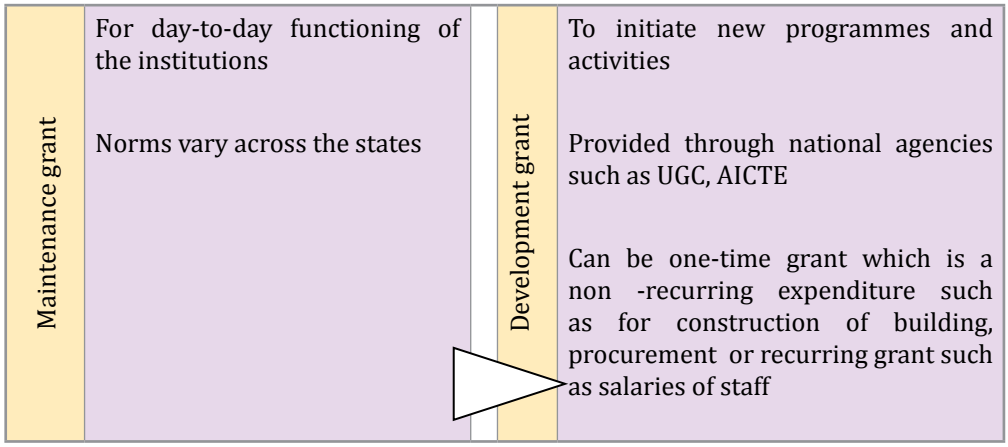
- **A medical college or a university having an institution for allied health sciences with complete organisational infrastructure and functional autonomy:**

There are a number of highly advanced and well-established institutions like Manipal College of Allied Health Sciences (MCOAHS), Post Graduate Institute of Medical Education and Research (PGI) Chandigarh, Jawahar Institute of Postgraduate Medical Education and Research (JIPMER), Sri Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), All India Institute of Medical Sciences (AIIMS), in which state-of-the-art technology is used for teaching and training. BSc/MSc programmes are available, as well as PhD programmes in a few cases.

ii. Financing of higher education in India

Financing for higher education in colleges and universities is through multiple sources such as fees, government grants, philanthropy, sale of publications, among other sources. The central and state governments ensure the availability of funds to the universities through agencies such as the UGC and AICTE for the development and maintenance of the education system in the country. The types of grants provided to the institutions / universities are depicted in Figure 4 below.

Figure 4: Types of grants to institutions and universities for higher education



Issues with the funding mechanism

- The literature review indicates that state grants have multiple drawbacks such as unequal distribution, non-specificity of rules and regulations, inadequacy of the quantum of assistance and lack of feedback on the utilisation of grants.
- The grants and funding provided by central organisations are also incongruent. For example, most of the fund flow by UGC provides for building up of the physical facilities only. Many grants are provided for conducting research activities in several institutes, though there is no clear mechanism to detect and avoid duplication and overlapping of such studies.
- The poor management system of universities and institutes leads to underutilisation or misuse of the available resources.

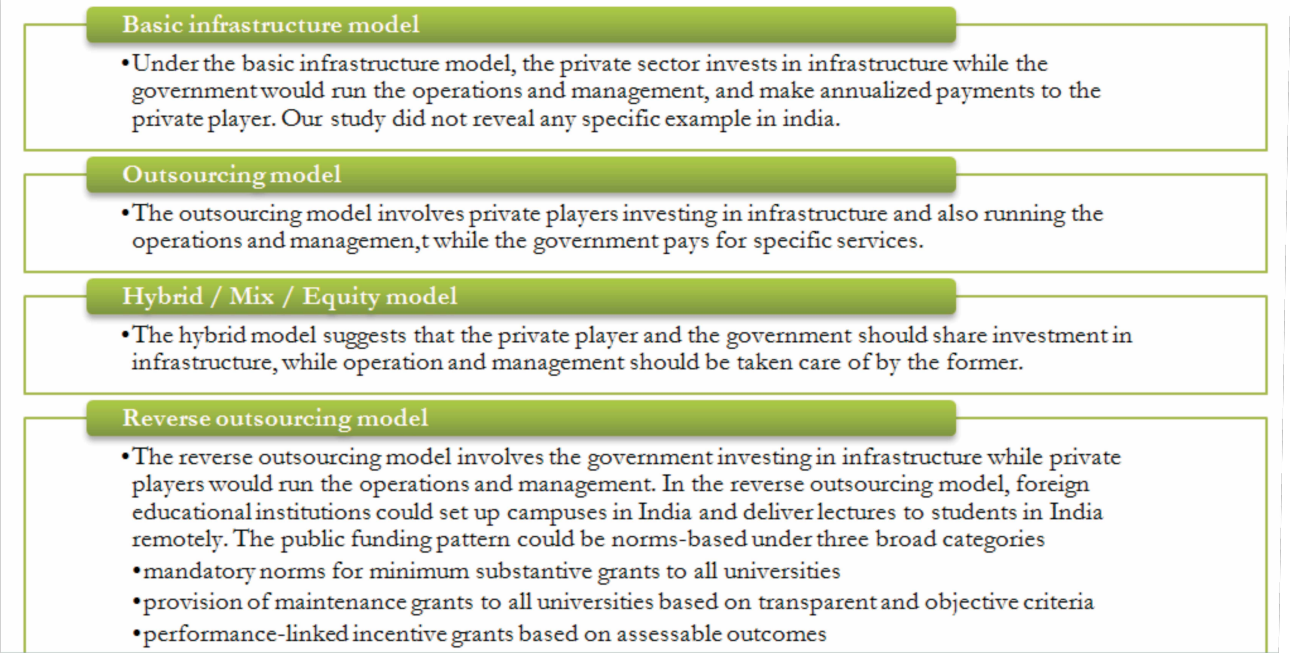
To sum up, central universities receive funds from the UGC as development (plan) grants and maintenance (non-plan) grants. Institutions of national importance such as the IITs and IGNOU receive their grants directly from the Ministry of Human Resource Development (Department of Education), Government of India. State universities are funded by the state governments in the form of block/maintenance grants as well as development grants. State universities also receive development grants from the UGC, provided a matching component is given by the respective state government according to a prescribed formula. In addition, universities also collect fees from students and a few universities receive some financial support from trusts, philanthropists and industry. Government and private colleges receive funds from the respective governments in the form of grants-in-aid for maintenance and development purposes. The system of grants-in-aid is mainly based on a flat percentage increase on the previous year's budget, and does not take into account the changing academic and research needs of the institution, or changes in the price of supplies and increase in student enrolment. The role of non-governmental sources in financing higher education continues to be limited.

iii. Harnessing public–private partnerships[12]

Public–private partnership (PPP) is an approach through which services are delivered by the private sector (non-profit/for-profit organisations) while the responsibility for providing the services rests with the government. This arrangement requires the government to either enter into a 'contract' with the private partner or pay for the services (reimburse) rendered by the private sector.

PPP provides an opportunity for private sector participation in financing, designing, constructing, and operating and maintaining public sector programmes and projects. There are potentially four models that could exist under PPP (Figure 5).

Figure 5: Models of public–private partnership



Benefits

The potential benefits expected from PPP are mentioned below with the underlying benefit being 'increased professionalism':

- Cost-effectiveness through mobilizing public and private capital – as selection of the developer/ service provider depends on competition or some benchmarking; the project is generally more cost effective than otherwise.
- Higher productivity – by linking payments to performance, productivity gains may be expected within the programme / project.
- Accelerated delivery – since the contracts generally have incentive and penalty clauses vis-a-vis implementation of capital projects / programmes, this leads to accelerated delivery of projects.
- Clear customer focus – the shift in focus from service input to output creates the scope for innovation in service delivery and enhances customer satisfaction.
- Enhanced social service – social services to the mentally ill, disabled children and delinquents, etc. require a great deal of commitment rather than sheer professionalism. In such cases, it is community/voluntary organisations (VOs) with dedicated volunteers who alone can provide the requisite relief.
- Recovery of user charges –innovative decisions can be taken with greater flexibility on account of decentralisation. Wherever there are possibilities of recovering user charges, these can be imposed in harmony with local conditions of governance structures.

Disadvantages

- Lack of trust and transparency –a lot of effort is needed to make the entire engagement transparent so that trust can be built on both sides and the consumer is benefited. A lot of time and effort goes into this, as clearly defined frameworks donot exist and, each time, efforts are made to evolve a PPP model. Once a PPP is formed, the entire process should be transparent to all the participating parties.

- People dependency – PPP frameworks should be between the public entity and the private players based on defined measurable, tangible and intangible metrics that are jointly agreed to by an independent third party.
- Risk mitigation plans –there needs to be greater public participation in a PPP model to reduce or mitigate the 'risk' of 'non-performing assets'. Poor performance is largely due to the 'monopolistic characteristics' of such activities.
- Weak regulatory systems – these would prevent competitive bidding or competitive negotiation in the selection of the service provider and a transparent monitoring and evaluation process to ensure that 'monopolistic' trends do not percolate the PPP.

c) Curricula and skills-based training methodology

Curricula are based on problem solving, guiding student's learning through solving complex, real-world problems, and by the effective use of simulators, thereby also ensuring patient safety. Field visits to premier institutes indicate that these colleges have standardised curricula for allied health streams, some of which are at par with international standards, and conduct continuous curricula upgradation in a timely fashion. However, the literature review points out that the curricula of similar courses in most of the colleges differ in content and structure across India. A detailed list of books used in various courses and specialties compiled by NIAHS secretariat is given in Appendix-6.

Table 3 shows some of the major shifts in trend of various components of the education system over time.[13]

Table 3: Shift in trend of components of the education system

From	To
Teacher-directed	Learner-centred
Direct instruction	Interactive exchange
Knowledge	Skill
Content	Applied skills
Basic skills	Applied skills
Facts and principles	Question and problems
Theory	Practice
Curricula	Projects
Time slotted	On demand
One technique fits all	Personalised
Competitive	Collaborative
Classroom	Global community
Text based	Web based
Summative tests	Formative evaluations

i. Shift to a skills-and competency-based education system

While 'skill' is defined as the ability to perform a task well and can be acquired through training or practice, 'competency' is usually a collection of skills and attitudes required to perform a function to expected standards.[14] In competency-based training, learning objectives are formulated based on competencies and enable students to attain these competencies in order to perform their tasks successfully. Therefore, students cannot be promoted to a higher level till they successfully demonstrate the required competency.[15]

Four essential components of competency-based training have been described.[16]

The competencies that are to be achieved are carefully identified, verified and then widely disseminated are given below:

- The criteria are firmed up, including the conditions under which these competencies will be assessed, and are listed and made known to the assessors and students.
- The course curriculum includes the development of competencies and training methodology.
- Actual performance during assessment determines the attainment of the specified competency.
- Each student will develop the competencies at his/her own pace.

Characteristics of competency-based training programmes

- Supporting theory is integrated with skill practice.
- Detailed training materials are designed.
- Participants' knowledge and skills are assessed as they enter the programme, and those with satisfactory knowledge and skills or those who have already attained competencies may by pass training.
- Learning is self-paced.
- Flexible training approaches are used, including large group methods, small group activities and individual study.
- A variety of support materials including print, audiovisual and simulations (models) is used.
- Satisfactory completion of training is based on achievement of all specified competencies.

Management of health facilities remains a weak component in both public and private sector hospitals. Increasing patient literacy and newer technology has made patients more demanding. While corporate hospitals have introduced training in information technology (IT) skills, communications and mobile technology applications, the public sector is yet to gain from advances in these areas.

Models and simulation laboratories play an important role in competency-based training courses. In this method, students in major disciplines first practise cardiopulmonary resuscitation on a human mannequin.

George H. Buck, after a historical review of the use of simulators in 1991, said,

'Given the developments in this technology within the last 50 years, it is possible that the use of simulators will increase in the future, should the need arise to teach new concepts and procedures at set times to large groups of individuals.'

Internationally, a competency-based approach has increasingly become vital for undergraduate and postgraduate training. The key to uniformity lies in the standardisation of content which, in turn, is based on standardisation of faculty development, frequent assessment of student performance and assessment of standard operating protocols. Patient encounters are used for developing competencies and also for evaluating performance. If there are any deficits, these are addressed through audio-visual aids, teaching sessions, observations and practice under supervision.

ii. Leveraging technology for skills building

Healthcare education and training is the backbone of an efficient healthcare system and India's education infrastructure is yet to gain from the ongoing international technological revolution. Our literature review and in-depth interviews indicate that teaching and learning of clinical skills occur at the patient's bedside or other clinical areas such as laboratories, augmented by didactic teaching in classrooms and lecture theatres. Though keeping up with the pace of technological advancement, there has been a paradigm shift to outcome-based education with adoption of effective assessment patterns and demand for demonstration of competence in some of the institutions.

Our study indicates that some of the allied health schools have instituted clinical skill centres, laboratories and high-fidelity simulation laboratories to enhance practice. Simulation is the replication of part or all of a clinical encounter through the use of mannequins, computer-assisted resources and simulated patients. The use of simulators addresses

many issues such as suboptimal use of resources and equipment by adequately training the manpower on newer technologies, limitations for imparting practical training in real-life scenarios, ineffective skills assessment methodsamong others (Table 4).

Table 4: Clinical learning opportunities imparted through the use of advanced techniques[17]

Teaching modality	Learning opportunity examples
Patients	Teach and assess in selected clinical scenarios
	Practise soft skills
	Practise physical examination
	Receive feedback on performance
Mannequins	Perform acquired techniques
	Practise basic procedural skills
	Apply basic science understanding to clinical problem solving
Simulators	Practise teamwork and leadership
	Perform cardiac and pulmonary care skills
	Apply basic science understanding to clinical problem solving
Task under trainers	Practise phlebotomy, lumbar puncture, etc.

iii. Internship as a skills-building exercise

An internship is done after completion of the academic cycle giving, for the first time, the aspiring health personnel a practical and hands-on learning experience outside the classroom. During the internship, students work with patients under a mentor. The most significant reason for an internship period is to help the students decide their area of expertise. However, internships may or may not be compulsory, depending on the institution conducting the course.

Under the guidance of a mentor, interns learn to analyse and report patient conditions and refine their skills. As interns require a lot of support from team members and the hospital administration, they are usually oriented before being placed in any department. Guidelines usually exist for their supervision along with professional development programmes. Thus, a successful internship programme has clearly defined policies and procedures with proper orientation programmes. Regular supervision and feedback mechanisms should be in place along with professional development activities.In India, internship is not compulsory for the same course in a number of institutions.

This situation exists due to lack of regulation. The duration of internship and payment of an honorarium during internship is also not uniform. Hence, the employability and salary levels of the students are not assured.

BOX 4: Apprenticeship models

The Ministry of Human Resources Development (MHRD) has set up the Central Apprenticeship Council for students to learn onthejob. Courses related to the health sector are as follows:

Graduate and technician apprenticeship: medical laboratory technology, biomedical engineering, public health engineering, medical laboratory/ technology assistants, health worker, nursing, child care and nutrition, health sanitary inspector, hospital documentation, hospital housekeeping, ophthalmic technician, physiotherapy and occupational therapy, X-ray technician, multi-rehabilitation worker, biomedical equipment and technician, dental hygienist, dental technician, multi-purpose health worker, pharmacist, ECG and audiometry technician, nutrition and dietetics, auxiliary nurse midwife (ANM) and primary health worker.

In this model, the theoretical aspect of learning is weak, and only the simplest skills are learnt, resulting in low-quality products. These are conducted under the aegis of the Central Apprenticeship Council.

iv. Assessment to validate skills in graduating professionals

Students undergo internal and external assessments, in addition to a theory examination at the end of each year or semester. The theory papers come from the universities to which the institutions are affiliated.

The semester system is not widely prevalent, though MCOAHS is in the process of converting to the semester system.

Internationally competency-based parameters form part of the performance procedures of regulatory organisations such as the General Medical Council (GMC) of the United Kingdom. In India, this is not embedded in the allied health education system. An objective structured clinical examination (OSCE) is used these days in a number of allied health courses, e.g. orthotics, optometry, physiotherapy and radiography to test the performance and competence in communication, clinical examination and medical procedures/prescriptions.

For instance, in physiotherapy, orthotics and occupational therapy, competency-based tests involve exercise prescription and joint mobilisation/ manipulation techniques. In radiography, radiographic positioning, radiographic image evaluation and interpretation of results are tested. The basic essential elements consist of functional analysis of the occupational roles and assessment of trainees' progress.

BOX 5: International Atomic Energy Agency (IAEA) training approach in radiopharmacy[18]

This training is designed to encourage local, national and regional empowerment. In most cases, local professional bodies create a framework for assessment and take responsibility for the follow up. National or regional nuclear medicine professional bodies set standards and accordingly assess the achievements of the participants. The same bodies also provide guidance for nuclear physicians as supervisors on standardised assessment requirements after three months. Three months on-the-job training and a practice diary under supervision of a tutor are essential. Daily log book entries and self-assessments are an integral part of the IAEA training in radiopharmacy practice. Each trainee is expected to prove a minimum level of competency after completion of the training. In some cases, professional bodies have also taken note of trainees' performances immediately following the training with a series of open and carefully designed multiple choice questions.

The key elements of a follow up include:

Practical log book entry for at least three months; feedback from trainee and tutor; and method of final assessment and certification In the practical logbook, not all elements have to be completed. However, an honest assessment of application is essential. Regular dialogue between the trainee and supervisor is essential to keep the process on track.

A periodic audit process of training should include reviews with trainees and progress reports following training. The trainees should be encouraged to provide feedback, therefore helping todevelop a sustainable culture of regular reviews, updates and change. Through regional projects, the IAEA can provide an external review process to further strengthen the system

d) Importance of affiliation of allied health institutes with tertiary-care hospitals/medical colleges

Reputed courses are usually run in institutions attached to tertiary-care hospitals. A skills-based method of teaching as described above can only be incorporated when students are able to practise their newly acquired clinical skills in a real-life setting such as a hospital or a high-tech simulation centre that will provide commensurate learning opportunities.

The advantage of a hospital is that the faculty is available and can be shared in the subjects of anatomy, physiology, biochemistry, pathology, microbiology, pharmacology, forensic medicine and community medicine—areas where there is generally a great shortage. It is possible to share laboratory equipment, especially sophisticated equipment, simulation laboratories, models, classrooms and audiovisual aids.

Allied health institutions attached/affiliated to a medical college or teaching hospital have many advantages over those that stand alone, as enumerated below:

- Since a large number of allied health services normally exist in a medical college hospital, the personnel there automatically become faculty in their particular allied health specialty.
- A medical college hospital has a heavy patient load. This is considered a conducive learning environment owing to the sheer exposure, demonstration and hands-on experience, which is not possible in places where the patient load is lighter.
- An affiliation with a medical college promotes updation of knowledge and skills through regular seminars and the culture of continuing medical education. Peer-group learning is possible among the allied health group, their seniors, and from nursing and medical students. The potential to acquire the skills to work in the entire gamut of scenarios, from those which are very basic to those which are sophisticated, is only possible in medical colleges.
- A larger number of students can be admitted per course in a medical college-affiliated institution. Since medical colleges work round-the-clock, there is constant availability of patients and mentors, and thus a variety of options are available for the same course, for example, evening classes, weekend classes and intensive contact sessions.
- Career paths for the faculty can also be realised in medical colleges, since there are possibilities for starting new courses, including degree, postgraduate diploma and doctorate courses, which require faculty to teach them. The possibilities for research in such institutions are also great.

Moreover, it is difficult to sustain a stand-alone allied health institution since the costs of running such an institution are very high and the fees collected from students are insufficient for the purpose. Hence, by affiliating with medical college hospitals, allied health institutions can stretch their budgets to levels of sufficiency.

e) Faculty shortage and development

Faculty development programmes have a critical role to play in promoting academic excellence and are highly regarded in medical, technical and professional education systems.

Such programmes are generally designed to improve an individual's knowledge and skills in teaching, educational research and educational administration.

BOX 6

Attachment with professional associations or networks: some institutions have formed partnerships with professional associations or networks for credibility, expertise or faculty, e.g. with organisations such as the Christian Medical Association of India (CMAI) and Rehabilitation Council of India (RCI). Some institutions have formed partnerships with hospitals for practical training, since they do not have their own hospitals.

Table 5: Estimation of faculty (National Commission for Macroeconomics and Health)[11]

Subject	For UG education	Additional for PG education	Total	No. of new faculty required annually
Anatomy	2346	315	2661	89
Physiology	2346	315	2661	89
Biochemistry	1216	315	1531	51
Pathology	3476	315	3791	126
Microbiology	1273	315	1588	53
Pharmacology	1931	315	2246	75
Forensic Medicine	1230	315	1565	52

Subject	For UG education	Additional for PG education	Total	No. of new faculty required annually
Community Medicine	2618	315	2933	98
General Medicine	2961	0	2961	99
General Surgery	2961	0	2961	99
Paediatrics	1545	0	1545	52
TB & Chest diseases	687	0	687	23
Skin and venereology	687	0	687	23
Psychiatry	687	0	687	23
Orthopaedics	1545	0	1545	52
ENT	687	0	687	23
Ophthalmology	687	0	687	23
Obstetrics& Gynaecology	2003	0	2003	67
Radiodiagnosis	1688	315	2003	67
Radiotherapy	744	315	1059	35
Anaesthesia	2575	315	2890	96
Physical medicine and rehabilitation	959	0	959	32
Total	**36852**	**3465**	**40317**	**1344**

Table 5 indicates the number of subject-wise faculty members required for undergraduate and post graduate teaching in medical colleges.

There is an overall shortage of teachers, which has an adverse impact on the quality of instruction. The situation is so acute that even state governments are compelled to undertake irregular practices, such as mass transfer of teachers of different specialities from one college to another on a temporary basis at the time of inspection of the MCI. Field work by NIAHS Secretariat has indicated an acute shortage of faculty in anatomy, physiology, biochemistry, microbiology, pathology, pharmacology, forensic medicine, and preventive and social medicine.

Trainers or teachers perceive faculty development programmes as a means to enable personal and professional growth, such as an opportunity to network with colleagues, and a platform for initial positive experiences to promote ongoing involvement. Institutes can either follow faculty development programmes or recurrent training and orientation sessions to improve the quality of teaching methods.
In India, there are few instances where conscious efforts have been made to improve teaching skills in the medical sciences. Some of them are listed in Table 6.

Table 6: Example of faculty development in India[19]

National teacher training centres (NTTCs) and medical education units (MEUs)	First NTTC at JIPMER, Pondicherry, in March 1976 This was supported by WHO. Three more centres established by the Ministry of Health and Family Welfare (MoHFW) at Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh; Banaras Hindu University (BHU), Varanasi; Maulana Azad Medical College (MAMC), Delhi. Six- to ten-day courses were conducted for medical college faculty. These resulted in a large number of innovations and setting up of MEUs in medical colleges.
K.L. Wig Centre for Medical Education and Technology (CMET)	K.L. Wig CMET set up at AIIMS, New Delhi in 1989–90 Support from governments of UK and New Zealand Teachers sent to the UK Organised a national conference in November 2007 with Foundation for Advancement of International Medical Education and Research (FAIMER)
Consortium of Medical Colleges (CoMC)	As part of a WHO-SEARO initiative, AIIMS, New Delhi, IMSBHU, JIPMER Puducherry and CMC Vellore collaborated with the Medical Education department at the University of Illinois, Chicago. These institutions formed a consortium with 16 medical colleges. They prepared a curriculum document with national consensus specifying a list of essential skills, with 'must know' and 'good to know' categories, and outlining integrated modules on topics of national health importance. The consortium activities ended as it stopped receiving support from WHO-SEARO.
Consortium of Medical Institutions for Reform of Medical Education (CMIRME)	Formation of medical/health science universities to support medical colleges and other health-related institutions for quality education, initiating faculty development courses, promoting research Six of these, Rajiv Gandhi University of Health Sciences (RGUHS), Karnataka; Dr MGR University, Tamil Nadu; Manipal University, Karnataka and Maharashtra University of Health Sciences (MUHS), Nashik, established curriculum development units. They conduct faculty development and training-of-trainers (TOT) programmes.
Consortium of Health Science Universities (CHSU)	Foundation for Advancement of International Medical Education and Research (FAIMER) (2001)
Foundation for Advancement of International Medical Education and Research (FAIMER) (2001)	FAIMER at Philadelphia is a non-profit organisation of the Educational Commission for Foreign Medical Graduates (ECFMG), USA. It supported faculty development through two-year part-time fellowship programmes for the development of managerial and leadership skills. FAIMER has formed regional institutes worldwide. Three regional centres are located in India at Seth GS Medical College, Mumbai, CMC Ludhiana and PSG, Coimbatore.

There appears to be a lack of commitment at the central and state government levels towards faculty development as seen by the meagre and irregular grants given to the NTTC until 2002 and stopped

altogether since then.[19] The existing system of recognition of institutions appears to be based solely on criteria such as infrastructure, number of teachers, number of students, among others, without specific measures for quality of educational methods, periodic review of teacher's performance or accountability.

Our research also indicates that under the UGC, although importance is increasingly being given to faculty development, the health sector is yet to reap its benefits.[20] For instance, no grants were earmarked for the teachers to attend workshops and seminars in many institutes being reviewed for the situation analysis study. Similarly, in central, eastern and north-eastern India, the insignificant number of faculty training institutions indicates regional variability in faculty development efforts.

i. Transition of courses and development of teaching capacity

Education in the allied health streams is largely confined to hospitals and is encouraged in many policy recommendations such as the Bhore Committee Report and National Health Policy.[21, 22] Transitioning of courses from the limited hospital setting to institutes and universities is a recent development in the disciplines of allied health sciences and often regarded as a response to increased demand for these services and professionals.

The literature review indicates that in India, successful initiatives to address the educational gap in specialties such as audiology, speech pathology, orthotics and prosthetics and other rehabilitation-related disciplines, and regulating the courses through professional associations have led to reforms in the educational process through the formation of structured syllabi for the respective courses. However, much still needs to be done for other allied health sciences courses, which function in the hospital and diagnostic sectors.

The education and training of professionals in well-known institutes are conducted by professionals in their own disciplines, as well as others whose expertise may also be necessary for providing complete care to beneficiaries. Transitioning to institutional- and university-based arrangements has helped to harness teaching capacity in developing as well as developed nations.

ii. Training models and guidelines for instructors in various settings

There are several mechanisms for faculty development, such as teacher-training courses, workshops, conferences and seminars. Peer education, self-learning, learning from the internet and mentorship have been used for improving knowledge and practices among teachers.

Checklists were developed by Steinert and Mann in 2006, based on the cognitive development required for imparting technical competencies, and these methods were found to be much more effective than the traditional 'see one, do one, teach one' approach.

Figure 6: Levels of training suggested by WHO

The WHO committee in 1965 suggested three levels of training		
Educational specialists: Medical and other health professionals who have obtained training in education, or professional educators familiar with the health profession	***Educational leaders:*** Medical and other health professionals who would acquire sufficient knowledge of educational science to integrate into programmes of study in institutions	***Educational practitioners:*** Medical and other health professionals whose training would be limited to primarily improving their competence as classroom teachers or clinical teachers.
Source: Faculty development in medical education in India		

In most cases, our literature search and interviews indicate that there is no separate group of teachers dedicated to teaching allied health sciences. Even in reputed institutions across the country, the subject is taught by medical specialists and not faculty specializing in the allied health sciences.

Among those who study allied health sciences, the general career pattern has been to choose lucrative clinical career paths over academic routes. As per conservative estimates, there is acute shortage of 20–30 per cent of teachers in medical colleges in the country.[19] Research indicates that relying on physicians to teach allied health sciences, given the shortage of teaching physicians, has diluted teaching quality in both branches of medicine.

In the absence of well-defined career paths and physician-centred healthcare delivery, which results in a lack of recognition of the AHP's contribution, attrition rates are high and retention of talent is emerging as a serious concern. The sector does not nurture academic talent to turn them into future faculty. A comprehensive plan is therefore needed to train the existing graduate and postgraduate students in various apex institutes to enable them to take up teaching positions.

iii. Training of trainers

The concept of developing faculty dedicated to training AHPs is yet to be embedded in the educational system. Field visits to various allied health colleges imparting such courses shows that trainers train on the basis of experience gained on the job. This is largely because of lack of certified faculty development courses for AHPs in India.

Meanwhile, several options exist for training of faculty in other streams, as listed below:

- Continuing professional educational programmes;
- Workshops related to teaching strategies, test construction, evaluation or other issues;
- Seminars and participation in conferences;
- Community participation;
- Departmental faculty development programmes;
- Short-term courses;
- Obtaining additional qualifications in other areas related to their field such as administration, leadership, management and professional relationships;
- Provision of sponsorship assistance for research;
- Provision of ongoing support services;
- Provision of latest teaching centres and research offices; and
- Mentoring programmes such as those followed in the USA which include: advice and counsel, review of course materials, observation of instructions, assistance in processing evaluation data, bringing innovative ideas or modifying programmes based on evidence and data, conducting research-based evaluation of programmes, their implementation, and checking.

The literature review and research by NIAHS Secretariat indicate that the current allied health faculty in India is largely unprepared to assume the role of professional academicians. The need for instituting a professional development programme for prospective faculty in the allied health sciences will enhance their effectiveness. The first step in this regard would be to identify those activities for which there is the greatest need for faculty development.

3. Policy issues for consideration

Several key aspects required for a robust educational programme are lacking. These include infrastructure standards, human resource requirements, qualifications and career path design for professionals, licensing, continuous skill and competency upgradation through effective and supervised hands-on training, links with potential public and private employers, and modifications to existing policy guidelines on recruitment and staffing in public health facilities.

International best practices indicate that an effective faculty development programme seamlessly brings together aspects such as mentorship, research and continuous professional self-development standards while imparting training. In India, however, the quality and quantity of faculty is a major impediment to the capacity building of faculty in allied health sciences.

Budgetary allocations towards each of the issues listed below, along with flexibility to hire the number of allied health staff required by each level of the public health system, would go a long way in spreading

existing best practices in the allied health services.

- **Creating common educational platforms for the various health workers:**

A common educational platform for various health workers should be created so that resources can be optimally used and teamwork is promoted.

- **Expanding teaching capability and developing faculty development programmes:**

Qualified teachers need to be in place with adequate qualifications and experience. There is a need to map the levels of faculty present, from where additional faculty can be sourced and where the faculty development can take place. Based on this information, a systematic plan needs to be in place for faculty and its development, not only in technical issues but also in teaching. Faculty should be adequately reimbursed and a career path chalked out.

- **Integration of pre-service and in-service education and training:**

Pre-service curricula should incorporate lifelong learning, relevant health issues and competencies to prepare graduates adequately for in-service work. Lifecycle and modular approaches to learning also need to be incorporated. Lateral entry courses need to be initiated at various entry points so that health workers can join the workforce at different entry points and thereby have access to career growth.

- **Developing quality institutions based on the IIM and IIT models:**

It is necessary to provide high-quality education so that the allied health sciences become popular. The education provided can be modelled on the lines of premier institutes such as the IIMs and IITs. Collaboration needs to be established with premier national and international institutions and the corporate sector and their teaching methods, curriculum and practices incorporated. Twinning with good institutions will bring in quality and create opportunities for regular updation of knowledge, teacher exchange and placement.

- **Continuous improvement and quality assurance programme:**

A systematic quality assurance programme should be established, including development of protocols, standards and benchmarks specific for allied health.

- **Retaining students and teachers and addressing equity issues:**

A study should be undertaken to look into the issues related to high turnover of teachers and drop-out among students. These issues need to be adequately addressed. Gender differences too need to be studied and addressed.

- **Promoting the development of policies:**

National and institutional policies need to be in place for PPP and faculty augmentation and development through promoting the use of non-traditional teachers from different backgrounds. This will increase the availability of faculty. Incentives should be instituted for those persons willing to join the faculty. Other policy decisions include hiring part-time teachers from the clinical sector, recruiting teachers from the diaspora, conducting compulsory teacher training with in-service learning and continuing education, and introducing the semester system.

Allied health sciences constitute a wide variety of professionals that complement the clinical team of doctors and nurses. While standardising curricula and practice guidelines, the vast differences between each of these numerous cadres have to be kept in mind, and guidelines customised for each group using subject experts in the area.

It is also important to plan for scaling up the workforce under each cadre based on the epidemiological need in the respective regions. Factors to consider for this purpose are geographical and other access issues related to the population, duration taken to upgrade the existing staff to the requisite levels of competency, and the private sector hospitals and outpatient centres that would also require these services.

4. Recommendations

The recommendations for change in various elements of the educational framework of the allied health system have been formulated by NIAHS Secretariat, and approved by the health ministry at the conclusion of the National Initiative for Allied Health Sciences project.

It may be noted that the recommendations are made for initial implementation of future courses. Any change that is not implemented may be integrated in due course.

Recommendation 1

NIAHS should be an autonomous institute fully funded by the Centre through a combination of grants-in-aid and fees, and should serve as the apex centre of excellence within the nation for allied health services. We also recommend that the institute be fashioned along the lines of national institutes of excellence such as the Indian Institutes of Management (IIMs) / Indian Institutes of Technology (IITs) to ensure effective governance and management.

The RIAHS should also follow an identical structure at the regional level. It should be an autonomous institute fully funded by the Centre and hosted in the state premises, providing regional leadership to all the surrounding states.

NIAHS should function as an apex technical institute for allied health sciences, funded by the MoHFW for the promotion of allied health sciences in the country through education, training, research, evaluation,

consultancy and specialised services. A well thought-out management structure may be put in place to provide an overarching umbrella for the rapidly growing private sector hospitals, public sector facilities and technological advances. These require a relook at human resources, changes in the organisational structures, infrastructure and equipment.

Every college needs to formulate its vision, mission and goals in terms of academic, social and other objectives, and channel its personnel and other resources towards optimum realisation of the objectives. Thus, we recommend the following vision, mission and values for NIAHS.

a) Vision statement of NIAHS

To be the centre of excellence for teaching, training and research in allied health education and ensuring high standards of education to facilitate human resource development in allied health sciences to support healthcare delivery in the country.

b) Mission of NIAHS

The mission statements of NIAHS aim at translating the vision into action through:

i. Creating a stimulating academic environment with excellent learning facilities
ii. Setting up standards for education, which include curricula, development of faculty, and appropriate technology with an inbuilt dynamic process
iii. Accreditation and regulation of programmes and institutions
iv. Research and development
v. Acting as the think tank, catalyst andinnovator for allied health sciences
vi. To become part of policy formulation and bean advisory institution for allied health sciences
vii. Collaborating with institutions in India and abroad to enhance allied health education and promote institution building for quality, improvement and sustenance
viii. Creating opportunities for meaningful employment.

c) Values at NIAHS

i. Service to humanity
ii. Excellence
iii. Equity
iv. Convergence

v. Confluence
vi. Integrity
vii. Transparency
viii. Interdisciplinary team spirit
ix. Passion
x. Community orientation
xi. Catering to the dynamic needs of the industry

d) Composition of the governing body of NIAHS

The governing body would be responsible for all decisions relating to the internal management of the institute, management of finances and appointment of the principal/dean and the teaching staff. The recommended composition of the governing body is as follows:

i. The Chairman shall be a person of eminence, integrity and outstanding calibre with apostgraduate degree in the discipline of health, health policy, public health, management, technology, law or finance from a recognised university or institution with 20 years of experience in the respective field (not an ex-officio member but a full-time chairman)
ii. President, NBE
iii. Director, AIIMS
iv. Director, School of Paramedical Sciences, IGNOU
v. Director, IAMR
vi. Representatives from the MoHFW and Directorate General of Health Services (DGHS)
vii. Representatives from the Government of the NCR of Delhi
viii. Representatives from the private sector
ix. Representative from the National Board of Allied Health Sciences (NBAHS)
x. Representative heads from nominated affiliated institutions

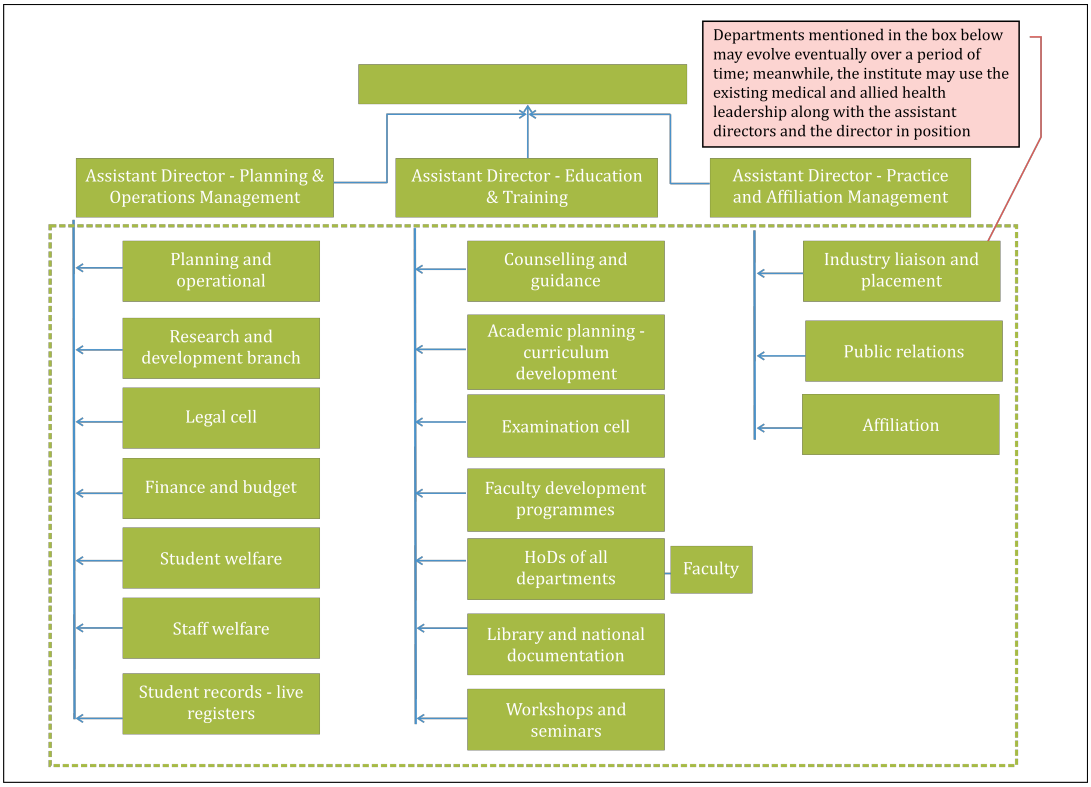
e) Composition of the governing body of RIAHS

The recommended composition of the governing body of RIAHS is as follows:

i. The Chairman shall be a person of eminence, integrity and outstanding calibrewith a post graduate degree in the discipline of health, health policy, public health, management, technology, law or finance from a recognised university or institution with 20 years of experience in the respective field (not an ex-officio member but a full-time chairman), preferably having demonstrated leadership in healthcare for that specific region.
ii. State Secretaries, Health and Medical Education
iii. State Directors of Health and Medical Education
iv. Principal/dean of primary attached medical college
v. Administrative representatives of all states of the region
vi. Representative from NIAHS to ensure coordination and communication between NIAHS and RIAHS
vii. Faculty of specialised departments of affiliated/ satellite colleges
viii. Representatives from the corporate sector/ private hospitals/private institutions
ix. Additional nominated members by the governing board of RIAHS
x. Civil society

A suggested organogram for NIAHS and RIAHS is given in Figure 7.

Figure 7: Illustrative organogram of NIAHS and RIAHS



f) Administrative committees under NIAHS and RIAHS

Appropriate organisational structures within the colleges are crucial for effective management. The simplest way to focus on a wide variety of activities will be to group the activities and functions expected to be performed on the college campus. Thus, the following administrative committees are recommended to ensure seamless operations at the national and regional institutes (Figure 8).

Figure 8: Administrative committees

Planning and Operations Management Committee

- Planning for training capacity, faculty and infrastructural needs
- Planning for future roles and responsibilities of AHPs, elligibility for stand-alone roles, national and international perspectives

Education and Training Committee

- Curriculum development, training of trainers, faculty development, conducting assessments of students, development of IT-based modules, simulations, skills-assessment methods, ethical considerations in training. Starting newer courses at postgraduate and postdoctoral levels
- Department of distance learning in affiliation with Distance Education Council (DEC)

Practice and Affiliation Management Committee

- Setting norms for affiliation, helping institutes to reach these norms, organising inspections and visits for affiliatates, conducting examinations for affiliated institutions
- Maintaining registers at the national and regional levels for graduates and feeding these into the central database for effective decision-making by the national board

i. Planning and Operations Management Committee

- Planning and visioning for accurate assessment of demand and future projections of demands on a continuing basis
- Faculty availability status and planning for augmenting capacity for future faculty development and production.

ii. Education and Training Committee

- Developing curriculumframeworks and teaching/ learning material and providing resource support to educators
- Developing, promoting and imparting faculty development programmes for conducting in-service training programmes
- Assessment of competency levels, development of question banks, continuous and comprehensive evaluation, and exit tests
- Conducting programmes for preparation of software and use of information and communication technology (ICT) for quality assurance and for teaching/learning
- Starting allied health courses, especially postgraduate and newer courses such as cardiac perfusion technology, dialysis technology, cardiac care technology, etc.

iii. Practice and Affiliation Management Committee

- Planning, monitoring, evaluation and research on allied health education and service
- Adherence to standards for certification of skills and competency levels as approved by the board
- Maintenance of live registers for regular updates on the demand–supply situation to the board.

Recommendation 2

Considering that health is a state subject, to ensure acceptability and successful integration of the new national and regional centres for allied health, it is proposed that both the NIAHS and RIAHS be fully funded by the Centre on an ongoing basis.

Several long-term financial sustainability mechanisms have been suggested below; however, it is highly unlikely, given the academic nature of these institutions, that they will beable to operate with positive margins. Thus, after bearing the initial set-up costs, the Centre should at least fund the differential operating costs to help the institutions to break even.

a) Financial management for assuring long-term sustainability of NIAHS and RIAHS

Financial management of NIAHS and RIAHS will require meticulous planning and implementation under the following heads:

i. Needs analysis of funds for NIAHS and RIAHS

ii. Fund generation from different resources

iii. Forwarding of proposals forfund requirements with approximate cost of different needs to NBAHS

iv. Approval of proposals from different training institutes across the country. Compiling and projecting the budget requirement of NIAHS and RIAHSs to the MoHFW budget allocation by NBAHS after approval of vote of accounts by Parliament under the Capital Head and Revenue Head

v. Fund utilisation as per standard policies and procedures, financial regulations of central/state government

vi. Forwarding of progress of expenditure as per schedule issued by NBAHS (expenditure by each quarter every financial year)

vii. Preparation of balance sheet, profit and loss statement and financial audit by the chartered accountant. Funds can be generated from tuition fees, grant from the government, research grants, technical assistance to other institutes, sharing of faculty and providing services, projects for implementation, etc.

For NIAHS and RIAHS, it is recommended that the central government provide funds for capital and recurring expenditure on an ongoing basis. Most states do not incorporate new institutions and personnel in their budgets; hence, the centre should support these

institutes. Grants-in-aid for regular courses should be calculated on the basis of regular intake.

NIAHS and RIAHS should work on improving their resources through tuition fees, services offered, funded projects and others. Funds will be spent or allocated as per the following heads:

- Academic
- Services
- Research

Institutes should adopt a policy of rational fixation of fees for basic and in-service courses so as to recover 50–60 percent of the costs incurred. This could be achieved by the following options:

- Running open courses (government and private sector) such as in the case of Sikkim Manipal University and IGNOU
- Accepting international participants from South Asian Association for Regional Cooperation (SAARC)/South-East Asian countries
- Sale of learning resources
- Bidding for research projects
- Recovering a fixed portion through fees from:
  - Resident students at nominal rates
  - Non-resident students who may be charged a fee based on international/private /market rate, which will provide cross-subsidisation.

b) Public–private partnership

The observations from the study conducted by KPMG and CII indicate six major thrust areas where a PPP could be evolved. This synergistic model would combine both the social objective of universal healthcare access and the business objective of running a profitable healthcare facility.

The six areas where private sector contribution can prove very beneficial are as follows:

i. Infrastructure development:

Development and strengthening of healthcare infrastructure that is evenly distributed geographically and at all levels of care

ii. Management and operations:

Management and operation of healthcare facilities for technical efficiency, operational economy and quality

iii. Capacity building and training:

Capacity building for formal, informal and continuing education of professional, paraprofessional and ancillary staff engaged in the delivery of healthcare

iv. Financing mechanism:

Creation of voluntary as well as mandated third-party financing mechanisms

v. IT infrastructure:

Establishment of national and regional IT backbones and health data repositories for ready access to clinical information

vi. Materials management:

Development of a maintenance and supply chain for ready availability of serviceable equipment and appliances, and medical supplies and sundries at the point of care.

In the reverse outsourcing model, foreign educational institutions can set up campuses in India and deliver lectures to students in India remotely.

The public funding pattern could be norm-based under three broad categories:

i. Mandatory norms for minimum substantive grants to all universities;

ii. Provision of maintenance grants to all universities based on transparent and objective criteria; and

iii. Performance-linked incentive grants based on assessable outcomes.

Generation of funds: funds can be derived from many sources; however, the Central authorities must ensure availability of funds in the initial phases of establishment. Fee sharing, affiliation and funds generated through affiliation are some of the sources.

Recommendation 3

A 100-bedded hospital has been recommended (as per the Cabinet note) in Najafgarh which shall eventually serve as a practice site for the graduating students of NIAHS, in addition to serving the needs of this populous West Delhi community.

NIAHS is to be located at Najafgarh with an attachment to a 100-bedded hospital. This hospital will be equivalent to an upgraded community health centre (CHC) or a sub-district hospital. There will be no super specialties in this hospital. Since the mandate of NIAHS is to conduct postgraduate and special courses, it is essential that a multispecialty hospital be linked to provide training. It has been identified that the hospital currently functional at Najafgarh is a 30-bedded hospital, which will take time to be upgraded to a 100-bedded facility with high-end diagnostics and treatment facilities such as an intensive care unit, neo-natal intensive care unit, etc.

The recommended details pertaining to the 100-bedded hospital structure are given in Appendix-7.

Advantages of affiliation to a medical college and teaching hospital

There are many advantages in having an allied health institution attached/affiliated to a medical college and a teaching hospital rather than having a stand-alone institution.

i. Sharing of resources:

- Sharing faculty in the subjects of Anatomy, Physiology, Biochemistry, Pathology, Microbiology, Pharmacology, Forensic Medicine and Community Medicine, in which there are usually huge shortages
- Sharing of laboratory equipment, especially sophisticated equipment, simulation laboratories, models, classrooms, audio-visual aids.

ii. Since a large number of allied health services are normally present in a medical college hospital, the personnel there automatically become faculty in that allied health specialty.

iii. Development of teamwork: In an affiliated institution, students learn how to work in teams.

iv. A medical college hospital has a huge load of patients with all types of problems. This is conducive to learning through exposure, demonstration and hands-on experience, which is not possible in places where the patient load is less.

v. The opportunity of learning from working in very basic set-ups to sophisticated set-ups is possible only at a medical college.

vi. An affiliation with a medical college promotes updation of knowledge and skills through regular seminars and the culture of continuing medical education (CME).

vii. Peer group learning is possible among the allied health group, their seniors and from nursing and medical students.

viii. A larger number of students can be admitted per course in a medical college-affiliated set-up.

ix. A defined career path can be actualised in a medical college set-up, as initiating a large number of new courses and starting degree, postgraduate diploma and degree courses, and doctorate programme is possible, along with faculty to teach in these institutions.

x. In an affiliated set-up, it is possible to have a variety of options for the same course, e.g. evening classes, weekend classes and intensive contact sessions, as medical college hospitals work round the clock. This ensures the availability of patients, hands-on experience and mentoring.

xi. Financial aspects: sustaining a stand-alone allied health institution is difficult, as the costs of running the institution are very high. The fees collected from students are insufficient. Allied health institutions can be sustained through medical college hospital budgets for medical and nursing education.

The situational review showed that universities/ institutions which have a functional organisation and

share infrastructure with medical colleges have the best curricula and learning culture.

Recommendation 4

It is recommended that expert committees for individual subjects be constituted to revise curricula. Expert committees should be constituted to revisit each subject and make modifications to the syllabus based on criteria such as:

- Skills and competency focus
- Bedside manner, patient communication and other soft skills
- Application of current technical knowledge and technological advancements
- Employability in both the public and private sectors
- Ability to choose either a practice, academic or management track in the field
- Adhering to national and international best practices

Standard teaching techniques have established that academic and professional excellence of the faculty is a critical component of the learning conditions for students to achieve educational and professional goals. The faculty needs to be looked at as crucial mediating agents through whom learning is transacted.

NIAHS should conduct research that documents practices reflectively and analytically on the quality and effectiveness of the present curricula. The first step towards this is to establish an expert committee of academicians which will review the curricula as well as propose national curricula for various courses on the basis of set criteria. In addition, frequent and periodic review of course curricula for each existing and emerging course should be undertaken by NIAHS and RIAHS to ensure relevance and a competitive edge in the market for allied health graduates.

a) Establishment of an education and training committee at NIAHS

It is recommended that NIAHS establish an education and training committee to be overseen by the assistant director of the education and training committee, under which sub-committees may be formed for each specialty course.

The functions of each of the sub-committees shall include framing the syllabi for various courses, reviewing and updating curricula periodically, determining the details for continuous assessment, recommending panels of examiners, and evaluating and recommending methods of teaching. The composition and functions of the sub-committees can be summarised as follows.

Composition

i. Head of the department from NIAHS/ RIAHS (Chairman)*

ii. Selected faculty from each discipline to be nominated from NIAHS and each RIAHS

iii. External experts in the subject from premier institutes such as AIIMS to be nominated by the Director, NIAHS

iv. One technical representative from end-users such as industry/corporate sector/allied area

v. Expert from affiliated institutions where these courses are conducted.

**If there is more than one institute running the same courses, a rotation policy of three years can be used for nominating the chairman and members. Not more than 13 members are proposed for each committee per sub-group.*

Term

The term of the nominated members can be of three [(3)] years.

Meeting

Meetings may be scheduled as and when necessary, but should be held at least once a year. Group e-mail communication is proposed between meetings to discuss issues.

Functions

The committees shall:

i. Identify the core competency for each job function and prepare syllabi and content for various courses, keeping in view the course objectives and national requirement, for consideration and approval of the Director, NIAHS;

ii. Suggest methodologies for innovative teaching and evaluation techniques;

iii. Suggest a panel of names for the appointment of examiners; and

iv. Coordinate research, teaching, extension and other academic activities in the various RIAHS/ affiliated institutes/satellite centres.

Research on educational methods

The main goals of research on educational methods should be:

i. To describe and document patterns of classroom educational methods;

ii. To measure the impact of pedagogical practices on student outcomes;

iii. To design and study learning environments that use innovative technological tools and accommodate individual differences among students;

iv. To identify effective intervention strategies that improve classroom teaching and learning; and

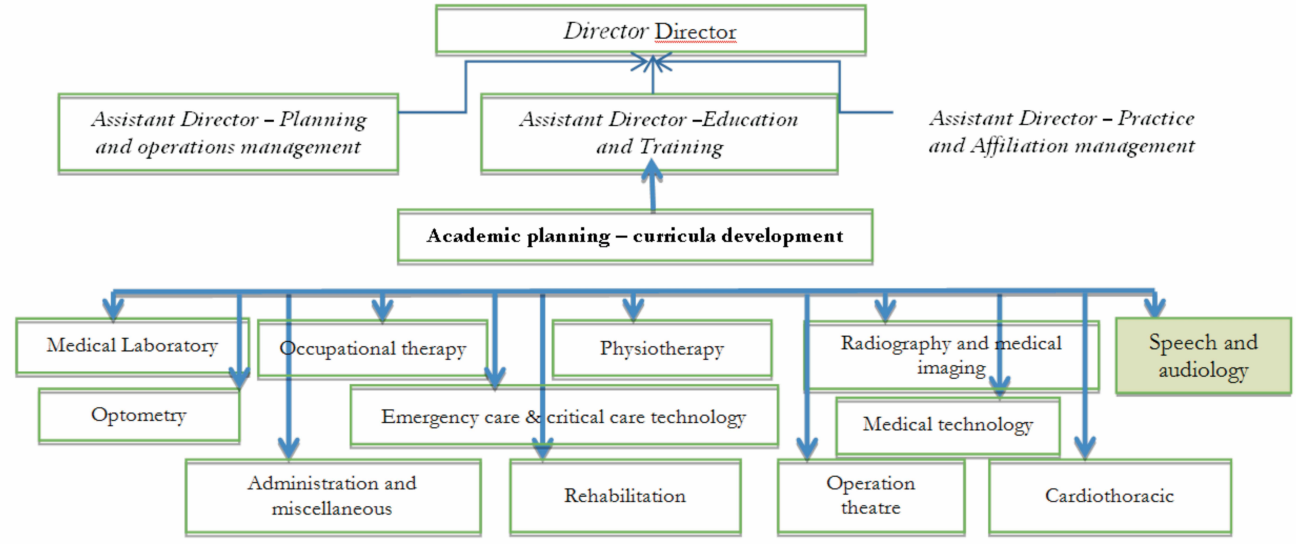
v. To identify and explore alternate models of learning in the field of allied health sciences to meet the current challenges of education.

This can be undertaken by:

- Self-assessment through pre- and post-test questionnaires at the end of each module;
- Exit interviews at the end of the final examination; and
- Online surveys of ex-students or professionals in the allied health fields.

The organogram in Figure 9 depicts the functioning cells under the Education and Training Committee headed by an Assistant Director.

Figure 9: Organogram of the Education and Training Committee



The situation analysis indicates that there is a need to create a new curricula framework in consonance with the changes that have taken place in different spheres of knowledge and practices in the field of allied health sciences worldwide. Moreover, there is an urgent need to develop curricula that focus on the competencies of professionals rather than mere book learning.

b) A competency-based approach to curriculum re-designing

A quality education includes assessing the student not only on knowledge but on the competencies the student has acquired. Hence, focus should be placed on competence-based learning in which, till the student is not competent on one skill, he/she cannot progress to the next level. There is, therefore, an urgent need to develop competencies not only for knowledge and technical skills but also in IT and soft skills like bedside etiquette, conflict resolution, communication, etc.

Competencies should be part of the performance procedures for selection of personnel. The basic essential elements consist of functional analysis of the occupational roles, translation of these roles ('competencies') into outcomes, and assessment of trainees' progress in these outcomes on the basis of demonstrated performance. Progress is defined solely by the competencies achieved and not the underlying processes or time served in formal educational settings.

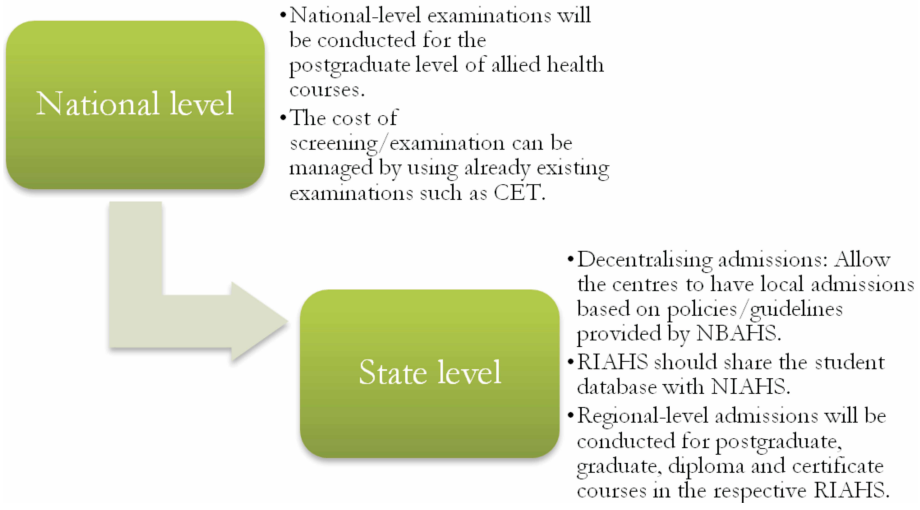
Competencies should be developed through the joint involvement of subject and technical experts, industry and professional associations, along with the National Skills Development Corporation (NSDC), asit is in the process of setting National Occupational Standards (NOS). The NSDC is setting up Sector Skill Councils (SSCs) which are, in turn, defining standards for accreditation. The prerequisites for setting up these standards include a clearly defined standard of performance for each set of personnel and avoiding underestimation of the kind of jobs/functions that even the lowest rung of personnel need to do.

NOS can best be defined by the employers themselves, hence these need to be developed by involving not only experts but also employers, including those in the corporate sector. Occupational analysis should be carried out to develop the NOS. After that, a review of the existing definitions is necessary, then identifying gaps and further defining the remaining occupations. The next step would be to define core skills which could be cross-sectoral, and then moving on to define skills specific to that sector.

As a part of occupational analysis, mapping is an essential step that helps to decide priorities. The first step is to conduct a needs assessment to identify where the need is critical or where the need has already been addressed and requires improvement. The second step is to identify the gap in the skill requirement. Each NOS would have a unique reference number (based on the sector, sub-sector and NOS number), an NOS title (referring to the exact occupation), overview, knowledge and understanding, and performance criteria.

c) Admission policy

Figure 10: Recommended admission policy at national and regional levels



RIAHS will communicate the result of the regional examination and admission intake information by specialty to NIAHS.

NIAHS will conduct entrance examinations only for postgraduate courses in allied health through a common entrance test at the national level. This will help NIAHS to update the live register as well as continuously manage the demand–supply gap. The nodal regional institute will be responsible for the overall seat matrix for all institutions in theregion. Priority for allocation of seats by specialty should be reviewed on an ongoing basis to address and adjust the dynamic demand–supply equation in both the private and public sectors. In addition, changing epidemiological profiles and disease dynamics in each region should also be considered while planning a specialty-based seat matrix.

Recommendation 5

It is proposed that the current teaching and training methodologies be reviewed for relevance, applicability, scalability, practicality and ability to translate didactic knowledge into skills and competencies for the students. It is therefore essential to adopt modern methods of teaching and training, including cutting-edge technologies such as simulation-based training in a team-based learning approach for effective skill building.

It is recommended that traditional learning methods be complemented with newer techniques to impart education. Use of demonstrative methods such as the mass media, simulation laboratories and webinars will not only increase student interest but also reinforce memory retention, as they provide connections between facts and real-world applications of those facts.

Concerted efforts need to be made so that institutions provide excellent and uniform training. Methods like **e-learning** offer tremendous freedom and flexibility and are, thus, are ideally suited to a wide range of health-related careers. Massage therapy, nursing and hospital administration, for example, are all popular programmes within the distance education sphere. Webinars are becoming increasingly popular, especially in the corporate sector, and are being used for CMEs in the US. **Webinar** as a learning technology will offer a platform to overcome the educational divide in allied health education and will help students get acquainted with the latest developments. Webinar has an edge in terms of its greater reach to audiences and ability to overcome geographical boundaries, and hence can be of tremendous use in rural and suburban set-ups.

It is recommended that degree programmes and individual courses be offered in the evenings. NIAHS can start weekend courses with the aim of helping working professionals and students who do not have the time to undertake regular training courses on working days.

It is recommended that internships be compulsory for all the courses, especially diploma and graduate courses. The duration of the internship needs to be standardised and the practice of paying stipends be followed to encourage and motivate students.

Conducting regular in-service training

A major pre-requisite for providing quality healthcare services is to upgrade the skills and knowledge of all health personnel. It is recommended that NIAHS develop a national training strategy detailing various pre- and in-service and refresher training courses and their frequency for the allied health force in the country.

Recommendation 6:

It is proposed to introduce an integrated 3-year BSc course in Allied Health Sciences.

It is proposed to introduce the integrated 3-year BSC in Allied Health Sciences, which consists of a common course for first-year students called the Bachelor in Para Medical Training (BPMT). In the second and third years, the students study the subjects they were enrolled for. The Sri Ramachandra University and Maharashtra University of Health Sciences model may be used. In the first year, the common courses are Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Forensic medicine, Pharmacology, Medical

& Surgical Nursing, Preventive and Social medicine, and basics of IT. The teaching hours and practical sessions will be standardised accordingly. These students could be recruited as general duty assistants (GDAs) through the creation and promotion of such a cadre in the public system.

As early as 1998, Hamdard University took the lead in conducting specialised courses for AHPs by starting postgraduate courses inphysiotherapy and occupational therapy. At present, Max hospital, Symbiosis and SRU are among the colleges offering three-year BSc courses in allied health sciences.

Another model of specialised training is to have a common course for first-year students such as the BPMT started by MUHS. The students go on specialise in chosen areas in the second and third years of study.

Nineteen Bachelor courses have come under this ambit:

Laboratory technician, radiographic technician, radiotherapy technician, cardiology technician, neurology technician, blood transfusion technician, optometry technician, plaster technician, anaesthesia technician, perfusionist, operation theatre technician, medical transcriptionist, cyto-technician, histopathology technician, transfusion medicine technician, clinical psychologist, community medicine/ health inspector/emergency medical services and forensic medicine.

According to the data available with MUHS, the total teaching hours in the first year are 690 hours of theory and practicals, including 64 hours of educational visits over 240 days.

Recommendation 7

It is proposed that NIAHS house and promote the concept of simulation-based training by establishing a world-class simulation centre called the Centre for Advanced Medical Education and Learning (CAMEL) and a fleet of mobile simulation units called CAMEL CARAVAN to offer high-fidelity skills training for healthcare professionals.

The **goals** of such a simulation centre would be:

i. To increase the safety, efficacy and effectiveness of patient care through innovative, interdisciplinary training;

ii. To allow for learning in a safe, non-threatening and controlled environment;

iii. To teach basic and advanced practical skills in patient management;

iv. To build confidence and enhance the performance of clinicians;

v. To increase exposure to critical, yet low-frequency, patient encounters in order to minimise the risk to patients;

vi. To increase effective communication among all members of the healthcare team;

vii. To develop simulation as a tool for the assessment of clinical skills;

viii. To use focused, methodologically sound research to measure the impact of simulation activities on learning and, ultimately, clinical practice;

ix. To significantly enhance quality improvement initiatives using simulation activities;

x. To provide hands-on experience for the implementation of best practices and consolidatethe process of continuous measurement and improvement; and

xi. To provide opportunities for remote learning and distance education through state-of-the-art IT tools.

The goal of delivering high-quality training and education to the healthcare workforce across rural and urban areas in an efficient manner can be realised by an integrated approach to using technology for medical education and skills training for physicians, nurses, allied health professionals and those in other disciplines of healthcare. There are four focus areas of advanced medical education and learning where technology can play an important role and address gaps in the training capacity.

The **first focus area** lies in delivering **practical training and skills assessment** to the healthcare workforce. Skills such as IV insertion, suturing wounds, central venous catheter placement, cardiac stent placement, endoscopy, advanced cardiac life support, basic life support, taking the blood pressure and ECG monitoring, to name a few, are the basis of modern-day medical practice. Practising these skills require a considerable amount of time and resources. Many of these skills are actually team skills that require the healthcare workforce to function efficiently as a team. Traditionally, these skills are practised on patients, which is an extremely unsafe and inefficient method of acquiring such skills. Fortunately, technology has been developed which allows for practising such skills repeatedly in a safe environment. Technology is also available for providing skills training on rare skills and treatments that enable the healthcare workforce to be prepared for any eventuality, including disaster management.

There are also provisions in technology for quantitative evaluation of skills. These allow for the development of benchmarks in examination and competency-based training. This is critical in ensuring high-quality healthcare to the masses. Such technology, centred on the core idea of medical simulation, has matured rapidly in the past few decades and has been shown to result in a marked improvement in clinical skills and quality of care. [2, 23-40] Medical simulation refers to a suite of technologies available for healthcare professionals to practise skills in a variety of disciplines, both individually and as a team. It is imperative to develop a coordinated approach to including simulation-based training in the medical education and training infrastructure in India.

The **second focus area** lies in employing technology for **remote education and monitoring.** A key element of training the healthcare workforce is to contextualise training to the socio-technical condition of the environment. Traditionally, this has been hard as such efforts require establishment of local infrastructure and support systems, which is expensive. With the development of the ICT backbone, it is now possible to deliver didactic content and training, and conduct examinations remotely. The National Knowledge Network *(http://www.nkn.in/)* is an example of such efforts in leveraging ICT for education. In a similar vein, we can deliver medical education and training remotely. There are, however, two additional opportunities that lie in further strengthening the mission of remote education and monitoring. The first lies in developing remote practice environments such as the skills training systems described above, so practical skills in addition to didactic material can be taught remotely. This is again possible with the technology of motion tracking, motion-based computing and virtual reality. The second lies in using technology environments to create personalised training modules that are consistent with the practices of a region and its requirements. This can again be done through personalised content delivery and by employing mobile units that deliver training through mobile systems.

The **third focus area** lies in delivering **best practices in design, implementation and training.** Best practices imbibed through guidelines, procedure checklists and decision-making algorithms have become the cornerstone of the quality drive in the medical profession.[41] Training for best practices and implementing and designing best practices are, however, not trivial. Simple didactic training for best practices is not enough and there is a need for a safe environment to practise implementation of best practices and adapting best practices to a particular socio-technical system. There is also a need for a safe environment to design best practices. System wide best practices and procedures can be designed and tested in a simulation environment and such efforts have been shown to have a highly positive impact in improving clinical practice, which is more significant than simple didactic training.[42] This is a golden opportunity for creating a culture of quality and safety in a systemwide manner.

The fourth focus area lies in practical training to ensure the optimal use of equipment and resources for quality healthcare. An important part of training is in using medical equipment, drug administration

protocols and making optimal use of existing resources. Traditional training only serves as an orientation but does not allow for advanced usage. There are many features of equipment such as ECG monitors that are not used efficiently due to lack of training. Simulation environments allow interfacing of medical simulators with equipment and provide the capability for designing training scenarios where equipment and resource usage can be taught.

Additional details of CAMEL are provided in Appendix-8.

Recommendation 8

It is proposed that a robust and on-going faculty training and development programme be instituted as part of the culture and framework of NIAHS and RIAHS.

Our experts were of the view that this investment by the MoHFW would be one of the most crucial drivers in changing the paradigm of allied and medical health education in the country and contribute immensely to augmenting the allied health workforce.

The establishment of NIAHS and RIAHS and expansion of training institutions for allied health specifically indicate the need for comprehensive teacher guidelines and facilitation guides for the faculty in the regional institutes, especially for those disciplines where the institutes have not formalised protocols for training of their faculty. There is a need to attract students in universities and institutions to take up teaching as a career. In fact, as part of cadre reforms, our experts have suggested three distinct tracks for AHPs – academics, clinical practitioners and managers.

The faculty development programmes to develop teaching capacity in medical/health education look beyond 'clinical competence' and 'scientific research skills' and look forward at professional skills development for teaching among the faculty.

a. Support for faculty development

Periodic teacher training courses should be organised, which should form an essential requirement for career development, promotion and empanelment as examiners. Teachers should be encouraged to attend faculty development programmes by offering leave of absence, travel grants or such other facilities to attend workshops and conferences. There should be continuous dialogue with the central and state governments, health sciences universities, MCI and NBE, and support should be provided so that they play a proactive role, identify active medical units and support them in developing faculty. Faculty in-service and induction training programmes should also be developed.

b. Revival of the various initiatives operationalised earlier for faculty development

The National Teachers Training Colleges (NTTCs), Medical Education Units (MEUs), Consortium of Medical Institutions for Reform in Medical Education (CMIRME), the Foundation for Advancement of International Medical Education and Research (FAIMER) Initiative, and the culture of providing fellowships and travel grants should be revived with support from the MoHFW and international agencies, along with the establishment of many more centres of excellence for faculty training.

There is a need to strengthen the curriculum development units at Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore; Dr M.G.R. Medical University, Chennai, Tamil Nadu; and Maharashtra University of Health Sciences, Nashik. In the other health universities, departments of medical education and technology need to be established.

c. Teachers' training curriculum

The teachers' training curriculum should be designed keeping in mind the changing scenario and multiple roles of teachers,apart from teaching. As far as possible, faculty development should be integrated with the educational programmes themselves. Separate sets of activities are also required. Incorporation of skills and competencies of diverse learning styles in teacher training programmes should include adult learning principles, student autonomy and self-learning, experiential and reflective learning, and computer-assisted learning, including the use of computers, the internet, distance learning, e-learning as well as skills-

learning laboratories – models, simulation laboratories and wet laboratories.

d. Teachers' training course content

Instructional improvement, organisational development, development of professional academic skills and teaching of specific disciplines should be part of the course content. Other important issues to be incorporated are ethics, management of services, computer and IT skills, use of skill laboratories including simulation laboratories.

e. Developing and using new assessment methods and tools

Several new methods and tools are now available, the use of which requires special training. Some of these are given below:

- Objective Structured Clinical Examination(OSCE), Objective Structured Clinical Examination (OSPE), Objective Structured Long Examination Record(OSLER)
- Mini Case Evaluation Exercise(CEX)
- Case-based discussion(CbD)
- Direct observation of procedures(DOPs)
- Portfolio
- Multi-source feedback
- Patient satisfaction questionnaire

The focus of student assessment has shifted to the use of multiple methods for testing a wide gamut of learning outcomes, such as higher cognitive abilities, communication skills, IT skills and professionalism, including ethical behaviour.

Many of the methods lay emphasis on frequent assessment of learning outcomes through predetermined, agreed assessment criteria, using observation check-lists or rating scales for scoring. It is therefore essential for teachers be aware of these new developments and suitably adopt them in the allied health education system.

f. Developing norms and standards for faculty

Norms and standards for faculty at all levels should be developed with the involvement of the NCTE. The main objective of the NCTE is to achieve planned and coordinated development of the teacher education system throughout the country, regulation and proper maintenance of norms and standards in the teacher education system, and for matters connected with these.

g. Developing an allied health faculty development resource centre

The resource centre should develop a database of persons who can become faculty and evolve strategies for attracting younger professionals and support various institutions in this process. A website and a blog for the AHS faculty should be developed for healthy discussions, sharing and learning.

h. Formulating strategies and supporting institutions in developing incentives for faculty

Recognition and encouragement are important factors in motivation.

- Teachers who have introduced innovations or contributed to improvement in medical education should be duly recognised and rewarded. There should be a mechanism for periodic review of the performance of teachers. Teachers should become accountable.
- Develop the concept of faculty governance where all members of the faculty play an important role in administering the diverse academic and non-academic activities of the institute. The empowerment of the faculty will become the propelling force behind the high quality of learning experience at various institutions.
- Foster close connections with industry in India and abroad through:
  - Consulting and customised training with organisations
  - Placements with corporate hospitals around the world
  - Participation of alumni in institute activities
  - Sponsorship of industry in research activities
  - Professorial chairs in the institute and others
  - Conducting the management development programmes for corporate hospitals.

- Paid summer internships should be made available in well-known corporate hospitals in India and abroad for junior faculty to gain first-hand corporate experience.
- Faculty exchange programmes can be held with a large number of institutions in India and abroad.

i. In addition, the following principles/tactical approaches should be considered in faculty development:

- Initiate training programmes for lateral entry to promote enhancement of qualifications to become faculty;
- Develop a database of persons who can become faculty;
- Tie-up with institutions conducting faculty development training programmes so that the faculty is trained in various styles of teaching;
- Initiate CMEs and participation in seminars and conferences for updation of knowledge;
- Tie-ups with institutions such as CMC and other national institutes of excellence for faculty to be posted to gain hands-on experience in teaching, methodology of mentoring, assessments and review meetings;
- Develop checklists, self-assessment tools, student feedback formats and standard operating procedures (SOPs);
- Institute review meetings for improvement in the quality of teaching;
- Develop a work culture of quality so that this is passed down to students who will actually benefit through getting placements in premier institutions; and
- Evolve strategies for attracting younger professionals and support various institutions in this process.

5. Conclusion

The following summary describes in brief the recommendations for the various components of the education system under the ambit of NIAHS and RIAHS based on our situation analysis.

a) NIAHS should be an autonomous institute, fully funded by the Centre on an ongoing basis through a combination of grants-in-aid and fees, to ensure long-term financial sustainability.

b) Formulate subject expert committees to review the curricula of 10 proposed specialty areas, based on specific criteria and propose national curricula to be followed across the country in various institutions of allied health. In addition, conduct frequent and periodic review of course curricula for each existing and emerging course to ensure relevance and a competitive edge in the market for allied health graduates.

c) Adopt modern methods of teaching and training, including cutting-edge technology for effective skills building.

d) NIAHS willhouse and promote the concept of simulation-based training to offer high-fidelity skills training for healthcare professionals.

e) Institute robust and ongoing faculty training and development programmes as part of the culture and framework of NIAHS and RIAHS.

f) Courses willbe conducted by specialty at both the national and regional institutes in a phased manner, keeping in mind the demand–supply gap by region and by epidemiological need.

The expansion of technology for practice increasesthe content that healthcare programmes, such as allied health courses, must cover. Advancement in educational technologies provides opportunities for new approaches in education delivery, including a shift to student-centred, active learning based on competencies and skills enhancement. The various suggested methodologies and techniques to be used by educators within several allied health programmes will ensure active learning and encourage students to deliver quality care. The MoHFW, thus, should consider how to best incorporate these active strategies into the allied health education system.

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** Please refer to Bibliography for additional references (attached at the end of the document).*

Process of consultations

The Public Health Foundation of India (PHFI) was awarded a project for undertaking a situational analysis for the National Initiative on Allied Health Services (NIAHS) 'Augmenting Paramedical Services' on 28 March 2011; vide appropriate notification from the Ministry of Health and Family Welfare, Government of India.

This national initiative undertaken by the Ministry of Health and Family Welfare, Government of India, is an historical opportunity to improve the health system landscape of India. The country's health systems cannot be strengthened without the availability of human resources for health (HRH). Since 'allied health professionals' (AHPs) perform an essential service role in any health care delivery system,[1] they are needed for increased access to and better quality of healthcare services.

In early April, a dedicated project secretariat was established at the Health Systems Support Unit of PHFI. By the end of May 2011, a large amount of knowledge had been accumulated. Diverse sources were visited and sifted to create a large bank of information on the concepts relating to allied health providers, their education, training, career planning and regulation. Diverse interest groups were consulted and the transactions documented.

This chapter aims to capture the highlights of our findings and the learning that emerged from each of the specific activities.

Terms of reference for the project

i. Desk review of the paramedical training landscape, including situational analysis, methodology of teaching, inputs and regulatory framework for the paramedical disciplines;

ii. Content development, including training of trainer (ToT) protocols, facilitation guides for faculty, and resource references and instructional kits for the NIAHS;

iii. Overall recommendations, including a framework to augment the availability of paramedical personnel, methodology of teaching, inputs, protocols for certification, regulatory framework and national standards, as well as benchmarking for accreditation;

iv. Recommendations for the National Institute of Paramedical Sciences (NIPS) and the Regional Institute of Paramedical Sciences (RIPS), including vision and mission statements, model for operations, implementation plan, relationship matrix outlining the roles of stakeholders, HR positioning, management arrangements, financial protocols and budget, protocols for a pedagogical renewal process, scope of alternate models of learning, framework for long-term sustainability, creation and updating of training content and modules, conducting regular in-service training and training on cutting-edge technologies.

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Key activities undertaken as part of the analysis

The activities took place in four phases:

Phase 1: Consultations and extensive desk review of national and international institutions, curricula, teaching methods, regulatory frameworks, business models and educational methods were conducted.

Phase 2: Aggregation and organisation of information collected from phase 1 during a desk review workshop held in Manipal, Karnataka.

Phase 3: Recommendation-writing workshop based on the findings from phases 1 and 2, which were appropriately shared with experts.

Phase 4: Completion of data collection and analysis from 276 national institutions and modelling of projected allied workforce requirements based on the supply-side data obtained.

Besides these four distinct phases, the last and final deliverable is a comprehensive report that captures the details of the findings in each phase of the project which was presented to the health ministry in January 2012

The major activities undertaken during the course of time are mentioned hereby:

1. Knowledge collation workshop

(15 April 2011 at the Sir J.J. Hospital, Mumbai, Maharashtra)

Participants (external) included Prof. R. Rangasayee, G. Mukhiyadan, Dr B. D. Athani, Dr M. V. Jagade, Dr G. D'Costa, Dr Ameeta Joshi, Dr (Col) K. Srikar and Dr Sammita Jadhav.

Participants (internal) included Dr Tarun Seem, General M. Srivastava, Dr Subhash Salunke and Ms Natasha D'Lima. Leaders and faculty were also present from renowned educational institutions in allied health services such as the Ali Yawar Jung Institute, Maharashtra University of Health Sciences, All India Institute of Physical Medicine and Rehabilitation, Armed Forces Medical College, J.J. Hospital and Symbiosis Institute.

Highlights of the discussions

The group agreed that 'allied health' required a diverse group of professionals to be incorporated under a common umbrella. For each specialty, standardisation of various components was necessary such as course duration and curricula among colleges.

Barring a few subjects, lack of qualified personnel was seen across the sector. Hence, it was deemed necessary to conduct a 'needs assessment' of HR based on the national requirements of the population rather than the positions available. The group decided on key institutes to be included in this programme such as Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh; Christian Medical College (CMC), Vellore; Manipal University; Armed Forces Medical College (AFMC), Pune and Institute of Paramedical Sciences, Lucknow, among others. They would also help to indicate institutions and the contact points of those whose opinions could contribute positively to this initiative. Suggestions were made to include courses for podiatry and Central Sterile Supply Department (CSSD) technicians.

2. Brainstorming session on methods and overall landscape of the project with PHFI leadership

(19 April 2011 at the Institute forStudies in Industrial Development (ISID) campus, New Delhi under the chairmanship of Dr Srinath Reddy, President PHFI)

Participants included all the senior leaders of the PHFI; Directors of the Indian Institutes of Public Health, Delhi and Hyderabad, Dr Sanjay Zodpey and Dr G V Murthy; senior advisors Dr Aiyagiri Rao, Dr Jay Satia and Dr Subhash Salunke, Head of Training Dr Abhay Saraf, Head of Human Resources Ms Kalpana Swamy, Head of Operations Mr Suresh Kumar and Head of Finance Mr Amit Chaturvedi. The presentations were made by Dr Tarun Seem, Head, Health Systems Support Unit and Ms Kavita Narayan, Associate Head Health Systems.

3. Landscape workshop on augmenting paramedical training capacity

(26 and 27 April 2011 at the National Institute of Health and Family Welfare (NIHFW) campus, New Delhi)

Participants included (external) Ms Aparna Sharma, Prof. Gouripada Dutta, Dr Ananthanarayanan P.H., Dr R. Chandrashekhar, Prof. Deoki Nandan, Dr D Thamma Rao, Dr Sita Naik, Dr R. P. Pai, Maj. Gen. (Dr) S. K. Biswas, Dr B. Rajashekhar, Col Anurag Salwan, Mr S. K. Kalra, Col. K. Srikar, Dr Sammita Jadhav, Dr B. B. Thukral, Dr A. K. Mukhopadhyaya, Dr Lalit, Mr J P Mishra, Dr S. B. Arora, Dr (Mrs) Naseem Shah, Dr Ritu Duggal, Prof. Dr Sangeeta Sharma, Dr Arvind Rajwanshi, Prof. Dr George Tharion, Dr Bipin Batra, Mr Sameer Mehta, Dr B. D. Athani, Dr Niranjan D. Khambete, Ms Lalita Shankar, Dr Sanjay Sarin, Dr Ameeta Joshi, Mr. Basab Banerjee, Dr Tapan K. Jena, Dr Raj Shekhar, Mr. Gulshan Baweja, Dr J S Dhupia, Dr Sanjay Aggarwal, Dr Adarsh Singh, Dr Anita Singh, Dr Supriyo Ghosh, Dr Shubnum Singh, Dr Somil Nagpal, Dr T Sundararaman, Dr Gowri N Sengupta, Dr K. S. Prema, Dr V. P. Sah and Mr Vivek Adhil.

Highlights of the discussions:

The participants were divided into five groups for considering five major terms of reference (TORs): physical inputs, educational methods, regulation, management models, and ToT protocols and facilitation guides, which were under the purview of this project. The major highlights of the discussions are as follows:

i. Physical inputs

The group came to a consensus that producing the right number of allied health personnel would not serve the purpose; the impetus needs to be on quality in training and skills acquisition must be the priority. In view of the term 'paramedical personnel' being deemed inappropriate by the expert group, it was suggested that the NIPS and RIPS be rechristened as the National Institute of Allied Health Sciences (NIAHS) and Regional Institute of Allied Health Sciences (RIAHS). For procurement of adequate staff and equipment, a public–private partnership (PPP) model was suggested due to shortages in the government sector.

ii. Educational methods

It was suggested that uniformity in the nomenclature of courses needs to be maintained, which should be decided before collaboration of the NIAHS and RIAHS is initiated with the University Grants Commission (UGC) or any other professional body. Standardisation of curriculum design and duration of courses was also recommended, which would be feasible with the advent of the Paramedical Council, NIAHS and RIAHS.

iii. Regulation

The group suggested that goals and principles of regulation of professional cadres to be developed. Networking should be attempted among the functioning councils so as to improve the coordination between them. Governance models of the Indian Institutes of Management (IIMs) and Indian Institutes of Technology (IITs) can be studied for this purpose. The group further considered three models for the regulatory structure, keeping in view the overall scenario:

- A single umbrella model
- A single paramedical council
- Dissociating physiotherapy from the proposed paramedical council bill since physiotherapy as a discipline under the Paramedical Council has been the subject of debate for quite some time and consensus has yet not been reached.

iv. Management model

The group suggested that the management model of NIAHS and RIAHS should have the following characteristics: sustainability, viability, flexibility and light-weight to enable ease of implementation within the existing system. It was stated that the existence of RIAHS as a separate entity or a department within well-established medical colleges is questionable and a cause for concern.

v. ToT protocols and facilitation guides

The group emphasised that the scope of training specifications for the allied health services is huge, thus it might not be possible to think about ToT protocols for all courses.

The group, while discussing the methodology for preparing the protocols and guidelines, suggested that the existing curriculum be reviewed in the institutions identified as regional institutes. The protocols would then be based on the gaps identified in these protocols or facilitation guides, if any. The group also collated a list of institutions that are known for their contribution to the field of paramedical and allied health services.

4. Exploratory work shop with paramedics

(2 May 2011 at CMET-AIIMS, New Delhi)

A knowledge-collation workshop was held with leading allied health service providers/practitioners of more than ten different specialties at the K.L Wig Centre for Medical Education and Technology (CMET), AIIMS, New Delhi under the chairmanship of Dr K.K. Deepak and Dr Adkoli.

Participants included Mr Vijay Aggarwal, Mr Pawan Kumar Popli, Mr Ramesh Sharma, Mr Baban Mohankar, Mr Pintu Kumar, Mr Prabhat Ranjan, Mr Rajeev Aggarwal, Mr A.S. Moorthy, Ms Poonam Mishra, Mr Harpreet Singh, Mr Yogesh Kumar, Dr Alka Mohan Chutani and Dr Sita Naik.

Highlights of the discussions

The group decided to have uniform entry criteria for AHPs and to keep options open for higher education. According to them, the credit system could be used to standardise assessments. They felt that cadre structures needed to be clearly defined and promotions should be assessment-based. Titles should be reserved for those with different degrees. The need for a certificate course was debated, as was the need for salary grades to reflect specialised training.

5. Workshop with NSDC and CII

(18 May 2011 at CII HQ)

A collaborative discussion was held with the National Skills Development Corporation (NSDC) and the Confederation of Indian Industries (CII) on the need for the establishment of a distinct sector skills council in healthcare, emerging from the issues related to paramedical capacity building.

Participants included Dr Naresh Trehan, Dr Shubnum Singh, Mr Basab Banerjee, Ms Anagha Khot, Mr Naveen Trehan, Mr Anoop Rawat, Col Badal Verma, Dr Nipun Choudhry, Dr Mahesh Reddy, Dr A K Sood, Mr Gulshan Baweja, Mr Rajesh Gopal, Mr Nakul Verma, Mr J Sunderajan, Ms Roshni Datta, Mr Jonathan Lance, Mr Joby George, Mr Marut Sen Gupta, Mr Ashwariya Kumar Doval, Ms Elizabeth Jose, Ms Vaishali Srivastava and Ms Cynthia Lobo.

Highlights of the discussions

The group proposed to analyse the human resource gaps in the areas of postgraduate/graduate, nursing and allied health to estimate the qualitative and quantitative demand and to plan for HR requirements accordingly to keep up with the industry growth (15%). The Sector Skill Council (SSC) was to use uniform National Occupation Standards (NOS) guidelines to obtain a common training certificate and to include the National Vocational Qualification (NVQs) Framework to enable the work force to enhance skills and obtain higher qualifications. All healthcare stakeholders were to be represented by a single SSC that would have a placement cell to facilitate employment. The group felt that they could start with pilot project courses having the highest employability factor and include others subsequently.

6. Detailed meeting with paramedics,

(21 May 2011 at G.B. Pant Hospital, New Delhi)

A workshop was held on the subject with AHPs belonging to existing formalised associations/other structures for governance.

Participants included the staff of G. B. Pant Hospital: Ashok Kumar, Rajkumar Goel, Anil Kumar, Niroosh Sharma, Jyotsna Gupta, Shashi Bhushan, Sanjeev Kumar, Prashant Kumar, Biswajit Das, Alka Sharma, Raj Kumar, Rattan Chand Kaushal, Mulkh Raj, Radhey Shyam, Deepa Arora, Swati Tyagi, Suman Kamra, G. B. Sharma, R. P. Gupta, Suman Gupta, K. Subbalakshmi Rao, Ajumi M. Noohu, Devendra Singh, Ramesh Kamra, Sudhir Kumar, Alice Kunjman, Savita Sharma, Rema Gopinathan, Thankamani Amma, Pramod Tripathi, Anjali Bhatnagar, Taruna Mathur, Neeraj Mishra, Anju Jain, Rajesh Kumar and U. S. Negi

Highlights of the discussions

The group raised issues related to the allied health cadre, such as ambiguity in nomenclature of positions, hierarchy, no autonomy in the execution of services, and a poorly standardised education system. They also highlighted the fact that there is no distinction in the remuneration and job, irrespective of the education level of the candidates. The group shared their concerns on a regulatory mechanism and career progression process also.

7. Detailed meeting with NSDC and CII,

(24 May 2011 at PHFI, New Delhi)

This was a follow-up discussion with the NSDC, CII and industry leaders representing leading hospital chains, device and equipment manufacturers, and technology solution providers on the importance of defining 'skills and competencies' as the basis for curriculum design, training and capacity building.

Participants included Ranjani Vaidyanathan, Naveen Trehan, Dr Anita Singh, Dr A. K. Sood, Rohit Chandra, Nakul Verma, Parag Varshney, Vaishali Srivastava, Ashok Chandavarkar, Lt Gen. Narayan Chatterjee and Jonathan Lance.

Highlights of the discussions

The SSCs were to define the National Occupational Standards(NOS) to aid self-improvement as they would include a clearly defined performance standard for all personnel and would provide clarity to all stakeholders. To design the bridge courses that would bring the existing workforce at par with the standard requirements, the core functions and performance outcomes were to be decided before building upon the expected occupations. Sustainability would be decided on whether the regulatory body would be the SSC or the paramedical council, while return on investment (by placement) would ensure the continued functioning of an institute.

8. Meetings with the paramedics group

(23–28 May 2011 at PHFI, New Delhi)

Individual specialty/cadre consultations were conducted with optometrists, physical therapists, speech therapists, operation theatre (OT) technicians, radiographers, radiotherapists, occupational therapists, laboratory technicians and audiologists. Highlights of the viewpoints shared by each of these groups of professionals are included in Chapter 3.

Participants included: a host of poeple encompassing the various specialties from among major institutions such as the G.B. Pant Hospital, Delhi; PGIMER, Chandigarh; AIIMS, Delhi; LNJP Hospital, Delhi and Safdarjung Hospital, Delhi, among others.

9. Workshop of regulatory bodies

(30 May 2011 at NIHFW, New Delhi)

A consultation was held with key regulatory agencies such as the existing state paramedical councils, Dental Council of India, Indian Nursing Council, Rehabilitation Council of India and Pharmacy Council of India, and accrediting agencies such as the NABL and QCI, autonomous educational/training institutes such as AIIMS, NIHFW, NBE, AICTE and IGNOU, industry leaders such as Dr Lal Path Labs, and leading development partners such as WHO and DFID, among others.

Participants included Dr R.K. Srivastava, Ms Aparna Sharma, Dr Maheshanand Bhardwaj, Dr Pankaj Kumar Ghosh, Dr R. N. Rai, Dr K. P. Aravindan, Dr Arvind

Theragaonkar, Dr A. K. Sood, Ms Anagha Khot, Maj. Gen. I. Cardozo, Billy Stewart, Archna Mudgal, Dr Punam Bajaj, Dr Bhawna Gulati, Dr Bipin Batra, Dr T. Dileep Kumar, Dr S. B. Arora,Brig. (Dr) Arvind Lal, Prof. Deoki Nandan, Dr D. M.Thorat, Prof. Rajvardhan Azad, Dr Kamlesh Kumar, Mr Shreekant Ranjan, Mr D. K. Ojha, Mr R. Das, Mr Sunil Nandraj, and Prof. Sanjay Shrivastava.

Highlights of the discussions

The group stated that currently, there are neither the data nor organised systems to manage the allied health workforce in India. There is no existing system for renewal of licenses, both for nurses as well as physicians (live register). When the national and state institutions have similar roles, the duplication causes conflicts of interest. The roles of the NIAHS and RIAHS should be clearly demarcated to avoid such hassles. NIAHS should have the primary responsibility for recognizing institutions while the states should recognise courses. In the long term, the NIAHS should be the overarching university once it establishes the requisite number of beds and capacity to provide training. Each RIAHS could be linked with the NIAHS. Once the NIAHS gets national recognition there could also be linkages with the six AIIMS-like institutions that are proposed, where possible.

10. Industry consultation

(7 June 2011, ISID campus, Vasant Kunj)

A national consultation was held on 7 June 2011 with industry on the National Initiative for Allied Health Services for Augmenting the Paramedical Training Capacity in India to involve industrial leaders in setting standards for training of paramedical personnel.

Participants included Himanshu Roy, Vineet Kumar, Pavan Choudary, Sundar R.K., Dr Ashok Moharana, Dr Anita Singh, Joby George, Sunith George, Dr Karthik Anantharaman, Aditya Singh, Dr Tamorish Kole, Dr Talat Halim, Capt. Indira Rani, Ranjani Vaidyanathan, Rajesh Radhakrishnan, Dr Punita Raheja, Prashant Mohan, Shivkumar Hurdale, Gulshan Baweja, Neha Daing, Chandrika Pasricha, Dr Asha Bakshi, Richa Gandhi and Vaibhav Gujral.

The discussions held wereabout course design, curriculum, perceived status gaps in the profession and other issues such as cadre restructuring, linguistic training, etc.

11. Field visits to major institutes

Institutes that are currently centres of excellence in these fields such as PGIMER Chandigarh, GMCH Chandigarh, CMC Vellore, Amrita Institute, Manipal College of Allied Health Sciences, Sree Chitra Tirunal Institute, J&J Ethicon Institute of Surgical Education New Delhi, Safdarjung Hospital, G.B. Pant Hospital, K.E.M. hospital, J.J. Hospital, IPHH, Ali Yavar Jung institute, AIIPMR, among others, were undertaken by the PHFI secretariat. Details on inputs such as infrastructure, faculty, student ratios, teaching methods and highlights of the curricula were examined in detail, in addition to management issues such as organisational structure, mission, vision and values, as well as financial sustainability models, if present. The details of these visits are summarised in Chapter 3 of this report.

12. National data mapping

Questionnaires were dispatched to all the medical colleges across India under the notification of the Ministry of Health and Family Welfare. Out of 339 questionnaires sent, responses were received from 276 colleges across India. Data analysis of the questionnaires was undertaken by the Organisation for Health Management and Rural Development (OHMRD) assisting PHFI in this initiative. The objectives were as follows:

- To review the structure and functions of the educational institutions offering any allied health course;
- To evaluate the allied health courses in terms of their ability to produce degree, diploma and certificate holders with the expected knowledge and skills;

- To assess the quality of allied health courses in terms of training pedagogy and content.

Twenty experts divided in five teams covered all five regions of the country to complete the data collection on the basis of the questionnaire sent by PHFI. The details pertaining to the process and the results are indicated in Chapter 3 of this report

13. Situational review report writing workshop

A three-day situational review report writing workshop was organised between 4 and 6 July 2011 by the Manipal College of Allied Health Sciences (MCOAHS). The faculty from MCOAHS and Medical College participated actively and undertook the majority of the writing work.

External experts and those from the MoHFW included Ms Aparna Sharma, Mr Aditya Goyal, Mr Ajeet Bharadwaj, Dr Prema K. S., Dr Sammita Jadhav, Dr Anita Singh, Mr Vineet Kumar, Dr K. P. Aravindan, Dr Pritish J. K., Dr Ameeta Joshi, Col K Srikar, Mr Ashok Chandavarkar, Capt. Indira Rani ,Dr J.P. Mishra, Dr Bipin Batra, B. Paul Ravindran and Col Anurag Salwan.

Representatives from Manipal included the Dean, Dr V. Rajshekhar, Pro-Vice Chancellor Dr Vinod Bhat and Medical Superintendent Dr Pulgaonkar, Dr Kaushik Sau, Dr Shivanand Bhushan, Mr T. Sri Harsha, Dr R. P. Pai, Dr Shashidhar Rao, Dr Rajesh Sinha, Mr Avik Ray, Mr Noushad, Dr Ramesh Unnikrishnan, Dr Ayas Muhammed K.P., Dr Vivek Raghavan M., Dr Sabu K.M., Dr Abraham Samuel Babu, Dr Krishna Y., Dr Sibi Oommen, Dr Sunila John, Ms Nilna Narayanan, Ms SebestinaD'souza, Ms Srinidhi G.C., N. Manikandan, G. Ranganath, John Solomon M., Veena N.K., Megha, Saumy Johnson and Ms Dolha Saha.

A comprehensive situational analysis document was developed which provided the details of the major courses discussed, competency and skills-based models, ideal infrastructure requirements to run a world-class allied health sciences institution, as well as the use of simulation centres in scaling up these professionals.

The major contours of the infrastructure discussion for the national and regional institutes as well as the hospital in Najafgarh emerged after detailed brainstorming by Col Anuraag Salwaan, Col Srikar, Dr Kanav Kahol and Col Sajal Sen.

14. Final Recommendation writing workshop

(15–16 September 2011, Bristol Hotel, Gurgaon)

i. Overall ecosystem

The group comprised the following representatives: Ms Bhan, Dr Sita Naik, Dr Yogeshwar, Mr Pawan Choudhary, Dr Prem Nair, Ms Monica Choudhary, Dr Dileep Mavlankar, Dr Kanav Kahol (post lunch), and Dr Tarun Seem.

Highlights of the discussions

It was decided that the courses coming under the ambit of allied health will be called allied health sciences and practitioners will be called allied health professionals (4-year degree holders), allied health providers (diploma holders) and allied health workers (certificate holders).

Human resources for AHPs: The experts were of the view that, given the paucity of availability of AHPs, it is necessary to look at various models to augment the supply of medical and paramedical professionals such as PPP models, etc. The scope of deployment of the health cadre varies due to geographical diversity. It is, therefore, necessary to look at augmentation of medical professionals at primary and secondary health facilities with trained AHPs.

Methodology of training: Experts felt an urgent need to focus on faculty development and linking paramedical training to district general hospitals and medical colleges. Recommendations reflected in Chapters 3 and 4 have details pertaining to issues regarding methodology.

Quality improvement: Research funding and establishment of research centres of excellence (regional) should be done by ISRO, which should allocate funding yearly for promoting research

activities in allied health disciplines. In order to maintain quality, a central umbrella council needs to be created, and existing councils have to be harmonised with national standards.

Mainstreaming existing professionals: Most of the courses should be of diploma level; some specialised ones such as physiotherapy, occupational therapy can be for 4 years. Existing council-regulated disciplines such as nursing, pharmacy, to name a few, may not be included within the purview of AHPs. Details of the topic are reflected in Chapter 1.

Cadres may be created as in case of nursing and a distinction between diploma /degree holders can also be adopted from the nursing cadre. In the case of teaching, it should be replicated as in any other teaching cadre.

ii. NIAHS and RIAHS

The group comprised the following representatives:
Dr Shyam Ashtekar, Dr Athani, Dr Rajwanshi, Dr Prathapan Nair, Dr A. K. Mukhopadhyayaand Dr Kumkum.

Highlights of the discussions

The group decided that the NIAHS and RIAHS should evolve as autonomous centres of excellence mandated by an Act of Parliament, funded by the Central Government, including all the recurring expenses of the NIAHS and RIAHS. The centres would undertake teaching, training and research in allied health education. The mission, vision, governing structure and scope of activities are detailed in Chapter 4.

iii. Management of NIAHS and RIAHS

The group comprised the following representatives:
Lt Gen. Narayan Chatterjee, Dr Krishna Y., Mrs Praniti Batra, Mr Vijay Kumar, Mr M. P. Singh, Mr Anil Sharma and Dr Anita Singh.

Highlights of the discussions

Initially, a ToT programme should be institutionalised and subsequently, the faculty development (FD) programme should be put in place. The FD programme may be placed under the management of human resources and prospects of new courses to be started have to be debated in the house of the regulatory wing, the communication and research wing of the NIAHS.

iv. Inputs and educational methods

The group comprised the following representatives:
Col Srikar, Dr S.K. Sharma, DrK.P. Aravindan, Dr J.M. Tharakan, Dr Paul Ravindran, Dr Uma Nambiar, Dr B. V. Adkoli and Dr Nilesh Kokane.

Highlights of the discussions

It was decided that the course duration should be based on the content of the course. The duration of a bachelors' course should be 3 years + 1 year paid internship. A Masters' internship should be research-based or teaching-based. Provisions for lateral entry should be made. It was decided that the basic courses taught in the first 6 months should be common with appropriate additions made subject-wise, and periodic updation of curricula to be conducted by relevant experts. The HR requirements, management models for sustainability of the NIAHS and RIAHS, and alternative and assessment methods were discussed. Additional details of the discussions may be found in the recommendations section of Chapters 1 and 4.

v. Regulatory framework

The group comprised the following representatives:
Dr S. Salunke, Dr Col Sajal Sen, Dr J. P. Mishra, Maj. Gen. I. Cardozo and Dr Bipin Batra.

Highlights of the discussions

Management of NIAHS and RIAHS

Role delineation
It was decided that the NIAHS would take on the responsibility for imparting education, promoting research, developing faculty and providing technical support for administration, affiliation and AHS education itself, and through the nine institutions. For the purpose of regulating education and grant of affiliation, a National Board of Allied Health Sciences is to be conceived.

Management board composition and functions (NIAHS and RIAHS)

There will be a common governing board known as the National Board of Allied Health Sciences for all the 9 institutions with a rotating chair to avoid the hierarchy control of the Government of India on the institutions. The function of the board and NIAHS should be separate; the NIAHS may function as the secretariat for the governing board that will act as a regulatory and recognition body for all.

Options for structuring the AHS regulator
It was proposed to have an umbrella structure model of the AHP regulator, which would cover all the unregulated allied health professions. The function of the overarching councils will be setting and enforcing standards of professional conduct, live registers, growth and development of cadres, and dispute resolution within and among constituent councils.

The subject is dealt with in greater detail in Chapter 3.

15. Presentation of preliminary recommendations and draft report to the Ministry of Health and Family Welfare and offices of Directorate General of Health Services

A meeting was convened by the JS (HR) Mr Debashish Panda at 2 pm on 28 September 2011 in his chamber. The aim was to review the progress of the consultancy being provided by the PHFI under the scheme on establishment ofthe NIAHS and RIAHS and supporting HR development in government medical colleges for running paramedical courses through a one-time grant. The following people attended the meeting:

- Dr Arvind Thergaonkar, DDG(P), DGHS
- Ms Aparna Sharma, Director (PMS)
- Dr S. Salunke, Advisor, PHFI
- Dr Tarun Seem, Head, Health Systems Support Unit, PHFI
- Dr D.M. Thorat, ADG(P), DGHS

The draft report was submitted in two volumes: Allied Health Ecosystem in India and Establishing Institutes of Allied Health Sciences. As additional data were called for by the JS during this meeting, which would involve data collection and analysis from all medical colleges across the country, PHFI requested for an extension of the project up to December 2011 at no additional cost for completing all activities identified under the contract agreement with the MoHFW.

16. Modelling exercise to project future needs for producing allied health professionals by specialty and region across the nation

A model was developed to estimate allied workforce requirements. The questions for modelling helped to determine the following:

Data sources used in the study were (a) databases provided by PHFI, and (b) literature estimates. Review of the literature estimates was undertaken to analyse the different measures that have been used historically to determine the shortage of medical practitioners in developing countries.

Data requirements will be as follows:

a. Excel-based models developed for certain types of human resources by their individual organisations
b. Results from the survey conducted by PHFI on existing training institutes
c. List of health facilities mapped to each allied health workforce category
d. Any data on the 'ideal' staffing level of public health facilities
e. Data on installed/working public health facilities where the allied workforce are likely to be present
f. Any data on an existing installed database of private health facilities, either actual or projected
g. 2011 Census data
h. Burden of various diseases across the country
i. India/developing country-specific projections for required number of health workers per patient

The study aimed to answer the following questions: 'What allied health human resources are required?',

and 'Where are these human resources required geographically for efficient delivery of care?'

17. Final report compilation followed by dissemination of recommendations to key stakeholder groups

The final report was submitted in January 2012 and presented to the Consulting Monitoring Committee. The health ministry formally conveyed acceptance of the report in September 2012 and directed PHFI to undertake steps for production and dissemination of the final report in Decemeber 2012.

List of experts

External expert contributors

1. Maj. Gen S. K. Biswas, Academy of Hospital Administration (AHA)
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ABBREVIATIONS

AFMC	Armed Forces Medical College
AHP	Allied Health Professional
AHS	Allied Health Science
AICTE	All India Council for Technical Education
AIIMS	All India Institute of Medical Sciences
AIISH	All India Institute of Speech and Hearing
AIMS	Amrita Institute of Medical Sciences
AIOTA	All India Occupational Therapist's Association
ANM	Auxiliary nurse midwives
AYJNIHH	Ali Yavar Jung National Institute for the Hearing Handicapped
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy
BARC	Bhabha Atomic Research Centre
BHU	Banaras Hindu University
BITS	Birla Institute of Technology and Sciences
BMJ	British Medical Journal
BPMT	Bachelor in Paramedical Technology
BSc	Bachelor of Science
CA	Charted Accountant
CAMEL	Centre for Advanced Medical Education and Learning
CbD	Case-based discussion
CCTV	Closed Circuit Television
CEO	Chief Executive Officer
CET	Common entrance test
CEX	Case evaluation exercise
CHC	Community health centre
CHSU	Consortium of Health Science Universities
CHV/G	Community health volunteer/guide
CII	Confederation of Indian Industry
CMAI	Christian Medical Association of India
CMC	Christian Medical College
CMET	Centre for Medical Education and Technology
CMIRME	Consortium of Medical Institutions for Reform of Medical Education
CMOC	Common minimum optometry curriculum
CoMC	Consortium of Medical Colleges
CRHE	Council for Healthcare Regulatory Excellence

CSSD	Central Sterile Supply Department
CT	Cytotechnologist
CUSAT	Cochin University of Science and Technology
DCI	Dental Council of India
DEC	Distance Education Council
DGAFMS	Director General, Armed Forces Medical Services
DGHS	Directorate General of Health Services
DME	Department of Medical Education
DOP	Direct observation of procedures
ECFMG	Educational Commission for Foreign Medical Graduates
ECG	Electrocardiography
ECHO	Exploring careers in health occupations
EDUSAT	Education Satellite
EEC	Electroencephalography
EEG	Electroencephalography
EISE	Ethicon Institute of Surgical Education
EKG/ECG	Electrocardiogram
EL	e-learning
EMG	Electromyography
EMT	Emergency Medical Technician
FAIMER	Foundation for Advancement of International Medical Education and Research
FOGSI	Federation of Obstetric and Gynaecological Societies of India
GE	General Electric
GMC	Government Medical College ,Chandigarh
GoI	Government of India
GoI	Government of India
GP	General physician
HCPC	Health and Care Professional Council
HPCA	Health Professions Council of Australia
HPCAA	Health Practitioner's Competence Assurance Act
HPPI	Health Professions Partnership Initiative
HRH	Human resources for health
IAEA	International Atomic Energy Agency
IAMR	Institute of Applied Manpower Research
IAO	International Accreditation Organisation
IAP	Indian Association of Physiotherapist
ICMR	Indian Council of Medical Research
ICSSR	Indian Council of Social Science Research
ICT	Information Communication Technology

IGNOU	Indira Gandhi National Open University
IIM	Indian Institute of Management
IISC	Indian Institute of Science
IIT	Indian Institute of Technology
IMSBHU	Institute of Medical Sciences- Banaras Hindu University
INC	Indian Nursing Council
INI	Institutes of National Importance
INR	Indian national rupee [singular]
IPHH	Institute of Public Health and Hygiene
IPHS	Indian Public Health Standards
ISCO	International Standard Classification of Occupations
ISM&H	Indian Systems of Medicine and Homoeopathy
ISO	International Organisation for Standardisation
ISRO	Indian space research organization
IT	Information technology
J&J-EISE	Johnson and Johnson Ethicon Institute of Surgical Education
JIPMER	Jawaharlal Institute of Post Graduate Medical Education and Research
JJ	Jamshetjee Jejeebhoy
JSR	Jan Swasthya Rakshak
KEM	King Edwards Memorial Hospital, Mumbai
KPMG	Klynveld Peat Marwick Goerdeler
M.Phil	Master of Philosophy
MAMC	Maulana Azad Medical College
MBBS	Bachelor of Medicine and Bachelor of Surgery
MCI	Medical Council of India
MCOAHS	Manipal College of Allied Health Sciences
MD	Doctor of medicine
MEU	Medical education unit
MGR	M.G. Ramachandra university
MHRD	Ministry of Human Resources Development
MICU	Mobile intensive care unit
MLP	Mid-level provider
MLT	Medical laboratory technology
MMS	Mini mental state examination
MoHFW	Ministry of Health and Family Welfare
MoU	Memorandum of understanding
MRI	Magnetic resonance imaging
MSc	Master of science
MUHS	Manipal University of Health Sciences

NAAC	National Assessment and Accreditation Council
NABET	National Accreditation Board for Education and Training
NABH	National Accreditation Board for Hospitals & Healthcare Providers
NAHEAC	National Allied Health Evaluation and Assessment Committee
NAHEC	National Allied Health Education Committee
NBAHS	National Board of Allied Health Sciences
NBE	National Board of Examination
NBHE	National Board for Health Education
NCHRH	National Commission for Human Resources for Health
NCO	National Classification of Occupations
NCR	National capital region
NCTE	National Council for Teacher Education
NDMC	New Delhi Municipal Council
NEAC	National Evaluation and Assessment Committee
NHP	National Health Policy
NHS	National Health Service
NIAHS	National Initiative on Allied Health Services
NIPS	National Institute of Paramedical Sciences
NOS	National occupational standards
NRHM	National Rural Health Mission
NSDC	National Skill Development Corporation
NSSO	National Sample Survey Organisation
NTTC	National Teacher Training Centre
Obs&Gynae	Obstetrics and gynaecology
OCABR	Office of Consumer Affairs and Business Regulation
OECD	Organisation for Economic Co-operation and Development
OEM	Original Equipment Manufacturers
OSCE	Objective Structured Clinical Examination
OSLER	Objective Structured Long Examination Record
OSPE	Objective Structured Clinical Examination
PCI	Pharmacy Council of India
PG	Post-graduate
PGIMER	Post Graduate Institute of Medical Education and Research, Chandigarh
Ph D	Doctor of Philosophy
PHC	primary health centre
PhD	Doctor of Philosophy
PHFI	Public Health Foundation of India
PMR	Physical Medicine and Rehabilitation
PPP	Public-private partnerships

PSG	Polysomnography
QA	Quality assurance
QCI	Quality Council of India
RCI	Rehabilitation Council of India
RGUHS	Rajiv Gandhi University of Health Sciences
RHPA	Regulated Health Professions Act
RIAHS	Regional Institute of Allied Health Sciences
RIPS	Regional Institute of Paramedical Sciences
RML	Ram Manohar Lohia hospital, New Delhi
SAARC	South Asian Association for Regional Cooperation
SAMU	Service d'AideMédicaleUrgente'
SARRAH	Services for Australian Rural and Remote Allied Health
SCTIMST	Sri Chitra Tirunal Institute for Medical Sciences and Technology
SEARO	Regional Office for South-East Asia (of WHO)
SGPGI	Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow
SMUR	Service Mobile d'Urgence et Reanimation
SOP	Standard operating protocols
SSC	Sector Skill Councils
TBA	Traditional birth attendant
ToT	Training of trainers
UG	Under-graduate
UGC	University Grants Commission
UK	United Kingdom
USA	United States of America
VD	Venereal disease
VO	Voluntary organisation
WCO	World Council of Optometry
WHO	World Health Organization
WHO-SEARO	World Health Organization – South-East Asia Regional Office
WILP	Work integrated linked programmes

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NATIONAL INITIATIVE FOR ALLIED HEALTH SCIENCES

The Government of India, through the Ministry of Health and Family Welfare, appointed the Public Health Foundation of India (PHFI) as a technical partner to develop a strategic framework for building capacity for allied health.

The National Initiative for Allied Health Sciences (NIAHS) is a product of the concerted efforts of several stakeholders. The report recommends a paradigm shift in approach to health human resource management, in keeping with the national priority of providing affordable and accessible healthcare for all.

The fundamental aim of this project has been to equip policy-makers with tools to set benchmarks in regulation, education and training of allied health professionals, and bridge the vast demand–supply gap. The Government of India is committed to investing in national and regional institutes across the country to nurture and retain talent in the allied health space.

The NIAHS report is the first step towards moving from a doctor-centred health system to a team-based approach involving allied health professionals – a move that has globally demonstrated improved outcomes in healthcare delivery.

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