2019

Human Resources and Infrastructure for Health Sector in India

REPORT OF SUB-GROUP-IV OF EXPERT COMMITTEE ON ENHANCING RESOURCE INVESTMENT IN HEALTH (ECERIH)

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Executive Summary

1. **Mandate of this Report:** The Economic Advisory Council to the Prime Minister (EAC-PM) has constituted an Expert Committee on Enhancing Resource Investment in Health (ECERIH) under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM. This is the report of the sub-group of this committee, which was asked to address the issue of "Investment in Human Resources and Health Infrastructure"

2. **Scope of the Report:** This report-

   2.1. Estimates the current availability of human resources for health for each state. It points out how estimates differ based on sources and approach used to make the estimate, and the need to work with this uncertainty. The estimates cover not only doctors and nurses but also AYUSH and associate health professionals and support staff.
   2.2. Estimates the current capacity of educational institutions to generate human resources for health in terms of the seats available in each state in both public and private sector.
   2.3. Examines the norms for arriving at the human resources required for a given population and the basis on which these norms are arrived at.
   2.4. Examines two alternative principles of design that can be used to arrive at the number of seats that need to be created in educational institutions in each state to close the short fall in human resources.
   2.5. Estimates what would be the public expenditure on human resources for health- both for generation (additional seats) and for deployment. It then compares this estimate to the overall resource envelope that should become available as expenditure on healthcare.
   2.6. Considers the possible strategies to address the problem of skewed distribution of human resources- where some states have an excess and many states have large deficits- and how public financing must be oriented to closing the gaps where they are highest.
   2.7. Estimates the current public health infrastructure available in district health systems- and the shortfalls thereof.
   2.8. Estimates the increased investment required to close these gaps, as well as how public financing must be oriented to closing the gaps where they are highest.
   2.9. Estimates the current distribution and density of private health infrastructure, and strategies possible to recruit this infrastructure or otherwise support private sector to close infrastructure gaps- where these gaps are high.

3. **The Requirement:**

   3.1. The nation would require about 77 to 80 health workers per 10,000 population. Of this 45 would be core healthcare professionals- doctors and nurses and the rest would be associate healthcare professionals and support workers in equal measure. This is based on the norm that 44.5 per 10,000 doctors, nurses and midwives are required to achieve

80% coverage of the population for an essential basket of healthcare services. This is a WHO has recommendation made in 2016 and it replaces the earlier estimate of 22.5 per 10,000 which addressed only the needs of reproductive and child healthcare.

3.2. The distribution within the health workforce could be targeted at 1 doctor: 3 nurses: 3 associate health professionals + support workers, which would mean 1.1 doctors per 1000 population and 3.3 nurses per 1000 population or at current population, 13 lakh doctors and 39 lakhs in nursing. It would also mean about 20 lakhs in associate healthcare professionals – which is a wide range including AYUSH providers, dentists, pharmacists, physiotherapists, laboratory technicians, supporting technical staff for different clinical functions and life science professionals and public health managers all taken together. Further it would mean another 20 lakhs in support services with much less technical qualification but acting as aides and assistants and providing a range of support services ranging from administrative support to support in hospital and healthcare.

4. Current Availability , Gaps and Additional Seats Required

4.1. The numbers of health workers who are currently available and functional are difficult to assess because both approaches to measuring this have serious defects. The register-based approach over-estimates the numbers since there is no provision for deleting those who are not in practice. Census and survey based do not differentiate between qualified and not qualified, as these are self-reported, thus, are misleading and should not be used. However, when disaggregated for qualified providers based on education, these surveys are very useful.

4.2. There are currently an estimated 7.8 lakh doctors (6 per 10,000) by the register based approach and 4.29 lakh doctors (3.3 per 10,000) by the survey based approach. The total requirement of doctors is estimated to be around 14 lakh doctors (1.1 per 10,000 population). Though this gap seems enormous, the rate of current production (the number of seats in medical colleges) is close to 5% of the total requirement (65,000 doctors per year) - which is the optimal number needed to replenish the attrition per year in the work-force and even provide for some expansion. The situation is similar for the nursing cadre and for associate health professionals also.

4.3. However, medical, nursing and technical education have grown at such an arbitrary manner that there is over-production in those states where there is already an excess and an under-production where there are huge deficits. Both state policy and labour markets are unable to transfer human resources or access to medical education from regions of excess to regions of deficit. On the other hand, states and regions with excess production have to deal with the problems of unhealthy competition and sub-optimal use of scarce resources. The Report therefore recommends that both for generation and for deployment of human resources for health, the unit of planning be a State or Union Territory and in larger states with regional imbalances, it should be a district or a cluster of districts of about 2 million population.

4.4. The overall gap in year 2024, in number of doctors is anywhere between 3.02 lakhs and 6.12 lakhs depending on the approach to measurement used, but the trends are very

similar and the implications for additional seats are very much the same. There is a persuasive argument that we put forth in some detail in the full text to conclude that the optimal additional seats required for medical studies is as low as 17,132 –and further these are required only within 11 states which are as follows: Uttar Pradesh 4641; Bihar 4375; West Bengal 2320, Jharkhand 1464, Madhya Pradesh 1394, Rajasthan 1120, Odisha 959, Chhattisgarh 305, Punjab 251, J&K 190 and Meghalaya 113. In the states of Karnataka, Kerala, Tamilnadu, Andhra Pradesh, Telangana, Pondicherry, Goa, Maharashtra, Gujarat, Delhi, Punjab, most of the North-east states and Uttarakhand, no more additional medical seats are required. *The challenge is therefore not of absolute numbers as required at the all India aggregate- but its distribution across states (see tables 1.3.1 to 1.3.4 in the full report).*

4.5. However increasing 17,132 seats in these above listed states, many of them still coping with recent increases, is a huge challenge. These additional seats would succeed in closing HR gaps only if (a) it is done with public investment and (b) done within these 11 states and (c) accompanied by efforts to mobilize the necessary faculty from the national and even international pool. Addressing the gaps by adding more seats in states already having an excess as compared to their replacement level will not help, and could even worsen the situation. One could try for purchasing some seats for deficit states from states having excess capacity- but this is unlikely to work. Within states, earmarking seats for under-serviced areas has a greater chance of success- for all cadre except medical doctors. For medical doctors the rigidity of the NEET approach and its surrounding rules would come in the way.

4.6. Even among states that have created the required number of medical seats to meet the replacement level there would be a large backlog of HR deficits that they would have to overcome. These immediate gaps would be even more in states where deficits are high and additional medical seats are needed. An interim option for these states, is to train and deploy Mid-Level Healthcare Providers. This emerging category is defined a) by having clinical skills above that of the multipurpose worker and the nurse but less than that of the doctor and b) by having a strong public health orientation and c) being deployed entirely in primary healthcare. The approach recommended is to take select cadre of associate health professionals and nurses (GNM and B. Sc nurses and in some states even ANMs) and through a bridge course of 6 months (in some categories one year) equip them to served as MLHPs. Currently the government has made a commitment to create over 1,00,000 MLHPs- mainly by training Ayurveda practitioners or nurses with a six months bridge course in community health to serve in health and wellness centers. MLHPs would remain relevant for population based primary health care delivery even after the doctor deficit has been closed. In states with large deficits they could be required even at the primary health center and CHC level.

4.7. In case of specialists, the gap and skew in distribution across states and in different specialties is more, which necessitates more than the above measures. Different form of expansion of PG education- increasing DNB seats with the requisite for admission being a minimum work experience of three years rather than an entrance examination, scaling up a Family Medicine course whose main orientation is to provide the basic

specialists as needed at the CHC level, multiskilling of Medical Officers in specific specialist skills is thus required.

4.8. The situation in nursing is similar but the numbers are much higher. Even at current rate of generation, the deficit in year 2024 would be in the range of 14.74 lakh nursing staff to 23.85 lakh. The total seats required once the short-fall is closed and the system stabilizes at its full requirement of 39.86 lakhs is 1.99 lakhs (close to 2 lakhs). In India as a whole the total number of seats is already 2.57 lakhs. However if instead of averaging in India as a whole, we add the required additional number of seats to reach the replacement level in each state which has a deficit in number of seats, we need another 36,709 seats spread over the main EAG states with 90% of the deficit coming from just three states- Bihar (12,725); Uttar Pradesh (11,069) and West Bengal (9,781) (see tables 1.3.5. to table 1.3.8. in the full report).

4.9. However since current short-falls in the nurse deficit states are so high, that there is a need for a much higher increment of short-term nursing courses of the ANM and GNM variety. The additional number of seats could be anywhere from 78,833 to 1,39,418 and would have to be spread across 16 states. We note that Maharashtra does relatively well in number of doctors, but has a huge gap in nurses.

4.10. This report notes the very high degrees of unqualified nurses who are at work, largely in the private sector. Clearly the labor market is making up the gap using unqualified nurses. Meanwhile, central government policy heads in the other direction and (perhaps responding to reports of surplus nurses in the leading states) has mandated the conversion of all GNM courses into B.Sc nursing courses. This would be a major set-back for nurse deficit states. Government policy needs to factor in measures to address not only the better distribution of nurses, but measures required to restrict the use of unqualified nurses, even where qualified nurses are available, and measures to ensure that women in each under-serviced cluster of districts/ region are able to secure entrance to nursing education and secure regular employment within these same region/district.

4.11. Another important measure to close the gap of 23.85 lakh nurses (which is the estimated current deficit against requirements) is to add in the cadre of 10 lakh, or even 15 lakh ASHAs- as a para nurse that would help us close the gap. A process of formal certification of ASHAs is well under-way and if this can be scaled up, this may be the only way available to close this huge gap. Eventually the ASHA would become a cadre of community health nurses- by upgrading those who are willing and able to qualify and by replacing those leaving the ASHA workforce by community health nurses. The logic of recruiting and training a woman resident in that village /habitation for becoming ASHA must however be retained even when we have shifted to only certified community health workers/nurses as ASHAs.

4.12. Another area of concern across states is the quality of professional education and therefore available skills even among medical personnel who have the required educational degree or diploma. There are studies that show that their level of skills is not much higher then the informal providers with no formal training. For allied health professionals, without professional councils and regulatory bodies, this problem could be even more. Even states with adequate HRH need to focus on the quality and content

of the professional and technical education, as well as adopt better regulation practices that ensure that, only qualified persons are providing services in both public and private sector. In remote areas and clusters/regions which are identified as under-serviced suitable local institutions with a track record of service to the poor in that region must be financially and technically supported to train local men and women to play the role of whichever allied health professionals are required.

5. Financing Human Resources:

5.1. If additional seats required to be created and further these have to be based on public financing, the level of public investment required is approximately estimated at Rs. 5 lakhs per year per medical seat, Rs. 3 lakhs per year per nursing seat and Rs. one lakh per year for the associate professional/technical courses. The exact additional amounts needed per state would depend on the seats that need to be created and this needs to be computed for each state. For medical seats it would be an additional 850 crores spread across 11 states. For nursing it would be an additional 1000 crores per year of which 900 crores could be across three states. If the funds are carefully focused on gap based valid and verified measurements of available human resource and educational capacity of states and within state of district clusters/sub-regions of about 2 million population, the financial requirements would be manageable and the value for money would be high.

5.2. Creating adequate educational capacity is useful only if the human resources generated can be absorbed in high HR deficit states and districts. Even in HR surplus states, there are considerable districts and regions, which have inadequate access to essential health services. Left to the forces that constitute the labour market, human resources migrates from back ward areas to more developed areas, and from the developed areas to the national and international metropolis. Only focused public action can reverse the direction of movement.

5.3. Of the many demand and supply side options that are able to attract and retain healthcare services where they are needed most, the expansion of public services in under-serviced areas has shown considerable success. Much of these public services would be government owned and managed facilities, but where private not for profit agencies have established facilities, it could also be purchase of services from such providers. In terms of public investment the implications are the same. There is little point in expanding medical, nursing and technical human resources, unless it is matched by public investment to attract and retain them where they are needed most.

5.4. Based on the Indian Public Health Standards for both density and composition of public health services (with some modifications as indicated), the financial requirements for HRH for a cluster of districts of 2 million population would be Rs. 228 Cr. Extrapolating to the nation, and costing for 600 such units- the public health expenditure on HRH would work out to Rs. 1.37 lakh crores per year currently. Assuming that cost of human resources rise by 5% per annum, the expenditure on remuneration would be around 1.75 lakh crores.

5.5. Two important clarifications go along with this estimate of Rs. 228 crore for 2 million

population. A) In the above estimate the numbers of HRH planned for is less than half of what is required as was estimated earlier based on WHO 2016 norms. The other half could be from the private sector. B) In the above estimate, the investment required (Rs. 1,140 per capita) is approximately two-thirds of what would become available if the National Health Policy 2017 commitment of spending public health expenditure as 2.5 % of GDP (approx. Rs. 4,200 per capita) and two-thirds of this going to primary health care (district health systems) (approx. Rs. 2,800 per capita) is honored. The sum spent on HRH in public services would thus be about 60 % of public health expenditure on primary healthcare. The point that is being made is that the human resources proposed by the 2007 IPHS norms is realistic and well within the policy commitments that have been made.

5.6. There are no tested approaches by which commercial private sector can be encouraged to fill the gaps in under-serviced areas. Public financing of private sector through contracts or insurance have now been tried quite extensively over the last two decades, but even these have not worked to address the HR issue in HR deficit areas. Where public sector is unable to bring in the necessary HR, most PPPs do even worse. The only method that works, and that too serendipitously, is building up the public services. Once public services or even not-for-profit services get established in area, private sector facilities could follow. If with increase of public investment in HRH in HR deficient areas, private sector HR also follows, and as a result the state was to reach 77 to 80 health workers per 10,000 population, then the proportion of health workers in the adult workforce would become close to 2%. The average for the G 20 nations for this indicator is that health workers constitute 8% of the total health workforce, and in developed nations it is more than 10%. The norm of 80 health workers per 10,000 population is thus a minimum that the nation should aspire for.

5.7. Innovative public financing on human resources for health could address many of the problems of inefficiencies in workforce recruitment and deployment. In the Indian context, there is little evidence that monetary incentives play a major role, although some collective incentive to teams could help. There is even less evidence of successful Pay for performance models. The Thailand UC model which makes district allocation based on a mix of number of population served as well as the caseloads seen in the previous year, makes resource allocation more responsive to the needs of each district. The payment of salaries is part of this district allocation, but based on a negotiated formula, this component is segregated out and routed through the departments. Learning from this, the allocation of public finances to districts could be as a resource envelope whose size depends on the total population served (with adjustment for the higher density of facilities associated with tribal areas and for age composition) and the number and type of caseloads handled in the previous year. A proportion of the resource envelope to districts for all of healthcare would be the proportion that would become available for HR payments.

6. Infrastructure Gaps in Public Health Sector:

6.1. In such a district/cluster of districts of 2 million population, the required infrastructure for public services or publicly financed services should be the equivalent of 400 Sub-centers (functional as envisaged in the health and welllness centers design), 66 primary health centers, 16 CHC or SDH which together would have about 800 in-patient beds and 500 in-patient beds at the DH level. In addition to partially factor in the needs of tertiary care we add 200 beds for speciality services. This comes to about 1500 beds per 2 million population or only about 0.75 beds per 1000 population.

6.2. The 1500 beds that is projected as the minimum required in every cluster of 2 million population, could be "publicly owned and publicly financed" beds or "privately owned and publicly financed" beds. But this level of hospital capacity would be adequate to take care of only 50% of current hospitalization needs (assuming hospitalization rate of 5 per 100 per year). The remainder of 50% of hospitalizations could be catered to by the private sector operating within a market environment. If this minimum level of public hospital capacity is not built up, then access will remain inadequate and when access is inadequate, a strong demand side support would only lead to increased cost of care and high degrees of inappropriate care.

6.3. For 600 districts the resource requirements to build up such public primary care and public hospital capacity works out to Rs. 1,53,069 crores over a five year period. This sum should not be conceptualized as a onetime investment. There will always be a need for some new infrastructure that would be required, and renovation of existing infrastructure and maintenance of the rest.

6.4. The recommendation is for the creation of *central infrastructure fund pool* of Rs 30,000 crore per year to be created with a clear allocation for each state and, if required, an advance amount as well. As and when infrastructure is created and verified, the funds to reimburse the costs of construction can be drawn down by the state and district from the central pool. The verification would include ensuring that the infrastructure location and design is based on scientific need assessment, and that the necessary human resources for the functionality of that infrastructure have been sanctioned and are in the process of recruitment. There should also be a clause that within two years, a set of minimum outputs required of such a new facility in terms of services delivered, for that particular geographical and social context should be available. Such a process of financing would allow districts that make good progress on infrastructure creation to go ahead and districts with slower progress would not block funds flow. It would also ensure that infrastructure utilization proceeds on par with creation of infrastructure, and there is no wastage of funds. Such public financing takes into consideration that fund requirements of different districts would vary widely and a central pool rather than district wise uniform allocation would be more advantageous.

6.5. For urban areas with population less than 10 lakhs, planning for health infrastructure and human resources needs to be combined with the rural, using the norm of 2 million population and adapting it as per needs. This is important since most of the clientele of these urban hospitals would be rural population. Funds would be from central and state allocations, and the central/state pool could also mobilize additional resources from

tribal sub-plans, backward area development plans, locally operating extractive industries, and other such sources.

6.6. In Class 1 A and 1 B, known as the million plus cities, urban health infrastructure would need to be separately planned for. Here there is a need to get urban local bodies to take charge and to use various incentives to ensure that a modern approach to urban health planning benchmarked with the best internationally is put in place. All smart cities should prioritize a city health plan and the health infrastructure plan should be considered along with other infrastructure. In the million plus cities urban bodies would need to contribute substantially to resource mobilization.

7. Leveraging Health Infrastructure in Private Sector:

7.1. Infrastructure in the Private health sector has a distribution similar to that in the public sector, but even more skewed in favour of a few urban areas. In the million plus cities that account for 42% of Indian's urban population, there are 13,413 private hospitals of a total of 14,121 hospitals. Of this 24 % are smaller nursing homes with few beds. Trusts and charitable hospitals contributed to around 3 percent and corporate hospitals 1 percent. Of these 13,413 hospitals, 48 percent were located in just eight big cities that have population more than 5 million: Mumbai, Kolkata, Delhi, Chennai, Bangalore, Hyderabad, Pune and Ahmedabad. Mumbai alone is reported as having 16% of these hospitals. The distribution is most skewed in case of corporate hospitals as around 67 percent of them are located in the big cities. The corporate hospitals, because of their business model average over 29 doctors, mostly specialists per facility, whereas most other private hospitals have much less.

7.2. The presence of private sector hospitals in rural areas and in smaller cities is limited. There are huge inter-state inequalities in density of hospital beds and doctors in private sector. In areas where public sector has a large deficit, private sector is also deficient. This creates huge problems for leveraging their capacity to augment capacity in the public sector. There have been many efforts in the past, but success is limited. Publicly funded health insurance brings more clientele to existing hospitals but as yet does not promote more private investment in under-serviced areas. There is considerable unused capacity in the existing private sector and this could be leveraged through insurance schemes. However much of this capacity lies in areas where public sector already has good capacity, and there is the danger that insurance may merely shift patients from public to private hospitals, instead of increasing overall capacity and access.

7.3. There are a number of not-for-profit hospitals, which have established a business model where running costs are recovered through user fees and some element of cross-subsidy for the poor is built in through differential pricing. The initial infrastructure and subsequent expansions, are based on donations and not on bank loans. Most Mission Hospitals are of this type and they have a capacity of close to 60,000 beds across the country, almost the equivalent of all district hospitals- and some of them work in very remote areas. Some of these hospitals are participating in Publicly Financed Health Insurance scheme but many stay out because of delayed and

incomplete payments. These models could use grants for renewal or expansion of infrastructure. These hospitals could receive one time grants for expansion of beds, equipment and services. The hospitals that would qualify for such grants would be private not for profit hospitals with (a) proven track record of cross-subsidy, (b) working in a cluster of districts where there is a over 50% deficit in beds and human resources (c) are already providing a range of secondary and tertiary care services and (d) whose existing capacity is fully utilized e) who are agreeable to act as referral sites for government primary health programmes. Such grants could establish a range of comprehensive secondary and tertiary care services in very high service deficit areas.

In conclusion:

The main challenge in investing in human resources and infrastructure is to figure out ways to do it such that, it leads to the creating of these resources in the states and districts where there are deficits instead of adding more where there is a surplus. Though every avenue to secure private sector participation in developing and deploying HR or investing in infrastructure should be explored and followed up, it does seem however, that the main strategy for addressing HR and infrastructure deficits districts would depend on public investments in government owned and managed facilities.

Introduction

The Economic Advisory Council to the Prime Minister (EAC-PM) has constituted an Expert Committee on Enhancing Resource Investment in Health (ECERIH) under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM. The ECERIH has constituted 10 sub-groups and one of these is titled "Investment in Human Resources and Health Infrastructure."

Members of Sub Group-IV

1	Dr. T Sundararaman	Chairman
2	Dr. Rajani Ved, ED, NHSRC	Co-Chair/Anchor
3	Dr. Pramod Meherda, PS, Health, Government of Odisha	Member
4	Dr. Jayanti Ravi, Commissioner and PS, Health, Government of Gujrat	Member
5	Prof. Muraleedharan, IIT Madras	Member
6	Dr. Ravindran, Aravind Eye Hospital	Member
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9	Dr. Indranil Mukopadhyay	Co-opted Member

The crisis in human resources for health and the infrastructure gaps are more than a crisis in numbers. It is also a problem of distribution and the fit for purpose of the human resources available. The last two decades have seen a major expansion in health infrastructure and in the generation of human resources for health. India's medical colleges turn out close to 63,580 doctors annually (MCI website, access 26th April 2019) as compared to only about 20,000 doctors in the 2000s. Admittedly this is not adequate, but there are reasons to be concerned about a narrow focus only on numbers.

The National Health Policy 2017, states the key principle that should guide national policy on human resources for health as follows: "Workforce performance of the system would be best when we have the most appropriate person, in terms of both skills and motivation, for the right job in the right place, working within the right professional and incentive environment."

If the nature of human resource generation, deployment and utilization is flawed and fails to match the needs, more investment in human resources would lead to dysfunctional systems and a sub-optimal deployment or even wastage of scarce resources. Financing professional and technical education therefore needs to engage with questions of how to generate the right mix of skills and at the right places and how this workforce would be employed and supported.

Similar concerns also influence decisions regarding investment in infrastructure. The NHP - 2017 calls for a paradigm shift in planning for infrastructure and human resources from normative (referring to norms like one doctor per 1000 population, or 2 beds per 1000 population) to targeted approaches that address shortages meaningfully.

This report is organized into two parts. The first is on Human Resources and the second is on Infrastructure. The first part on HR has three sections. Section 1 discusses the current situation with regard to human resources numbers and their distribution in the different categories of human resources. This includes a discussion on the problems of data and we follow this by presenting the figures on availability of HR across states for doctors and nurses using two methods of estimation- which we call the study 1 approach and the study 2 approach.

In the second section, we discuss the number of seats available for medical education, specialist education and nursing across the states.

In the third section we have four sub-sections. The first presents our recommendations on the number of seats that need to be created and the states in which they are required, based on two alternative principles of design. Then the second sub-section presents the financial resource requirements for HR generation and deployment. It also relates to how resources can be mobilized to meet our requirement. The third sub-section discusses policy options in relation to our objective of ensuring that the expansion on infrastructure and human resources matches the needs. And finally there is a brief note on the specialist gap.

Part 2 of the report presents gaps and policy options with regard to infrastructure.

Doctors and nurses are only a part of the overall spectrum of Human Resource for Health. The main categories as used in health planning in India are presented in Annexure 1- along with an effort to map these to the ISCO codes (International Standard Classification of Occupations-2008 revision).

The focus of this report is on health professionals entrusted with clinical care -doctors, nurses and midwives, and now mid-care providers. We have also presented an overview of providers in the AYUSH stream and allied health workers. The report also constructs an approach to the rest. The final report would cover a simplified set of 10 categories of human resources for health

I. Health Professionals (Specialists, Doctors, nurses, midwives, mid-care providers and clinical care providers of the AYUSH stream)
II. Other Health Professionals (dentists, pharmacist, physiotherapists, hearing and sight related technical staff)
III. Associate Health Professionals (similar to the term Allied health Workers - Laboratory and imaging technicians and counselors)
IV. Peripheral or Frontline Health Workers (Multipurpose Health workers, Emergency technicians and ASHAs)
V. Management Staff with focus on public health cadre
VI. Life Science Professional- Entomologists, microbiologists, geneticists, epidemiologists etc.
VII. Secretarial staff – including accounts, data entry operators
VIII. Other support staff (sanitation, security, diet, maintenance, plumbers, mechanics) and personal care workers (nurse aides, help-desk workers, geriatric care workers)
IX. Traditional Healthcare providers- not formally trained
X. Informal Providers- not formally trained, practicing clinical care

The report is largely focused on the first category but will incrementally put together the available information on each of these categories- with a comment on data source and reliability of estimate. It also makes recommendations for each of these areas.

Part 1- Human Resources

Section I: Current HR situation- Numbers and Distribution

1. **Health Professionals- the numbers**:
   According to 2006 World Health Report, in India, there were 6 doctors, 8 nurses, 4.7 midwives per 10,000 population- about 18 skilled health workers per 10,000 population, below the recommendation of the WHO that 23 per 10,000 is the minimum desirable figure (World Health Organization, 2006). A recent study published in 2013, (Hazarika, 2013) concludes that in India, there are 20.8 skilled health workers per 10,000 population, of which 8.4 are doctors and 14.4 are nurses or mid-wives. *In this section, when we use the term doctors, we are referring only to medical doctors with an MBBS qualification*. These figures are based on professional registers. Figures based on professional registers are known to over-estimate the numbers currently available, since they do not have mechanisms for updating the registers to drop those who are no longer in practice. This study and the data therein is referred to as study 1, throughout this report.

   To correct this over-estimate, another set of studies look at census data and surveys of the national sample survey organization. This study too concluded that India had 20.1 health workers (of all categories) per 10,000 population of which 8 per 10,000 were doctors and 6 per 10,000 were nurses. However census based numbers are based on self-reporting and therefore over- estimates the number of qualified providers. After checking each self-reported health worker against their educational qualification the study concluded that only 2.6 per 10,000 doctors and 0.6 per 10,000 nurses were qualified. (Anand & Fan, 2016). We do not use the numbers from this study in subsequent analysis.

   The most recent study in this area is based on the National Sample Survey Estimates based on its 68th round on employment and unemployment situation in India (2011-12). This study, published in 2016, which we refer to as study 2, concludes that during 2011–2012 there were 2.53 million health workers in India, which translates into a density of 20.9 health workers per 10,000 population. After adjusting for qualification, the density of health workers declined from 20.9 to 9.1 per 10 000 population. The estimated densities by cadre were as follows: allopathic doctors 5.8 (qualified 3.3); nurses and midwives 7.6 (qualified 3.1); dentists 0.4 (qualified 0.3); AYUSH practitioners, 1.3 (qualified 0.6); health associates, 5.8 (qualified 1.8); and traditional practitioners 0.1. (Rao, Shahrawat, & Bhatnagar, 2016). This study is referred to as study 2 throughout this report.

   This problem in the numbers – with respect to non-qualified providers in one approach, and due to lack of live registers on the others affects all statements that we can make about human resources in health in India. Though by both these estimates some trends are similar- the extent of the crisis is understated by WHO live register based statistics and brought out much more sharply by census and NSSO based figures.

Study 1: Based on Professional Council's Data- ***Hazarika, 2013***

Study 2: Based on NSSO 68th round, 2011-2012 (Employment and Unemployment survey) Data- Rao, Shahrawat, & Bhatnagar, 2016

2. **Health Professionals- Requirements versus availability of Doctors**:
   Where are we with regard to requirements? There are two norms we compare with-

   If we assume a doctor to nurse ratio of 1:3, then one fourth of norm of 23 per 10,000 should be doctors- which works out to 6 doctors per 10,000 population- that would be a requirement of 8.16 lakh doctors. (World Health Organization, 2006)

   If instead we go for the revised WHO norm of 44.5 health professionals per 10,000 population (World Health Organization, 2016), and the doctor nurse ratio of 1: 3, then one fourth ,or about 11 doctors per 10,000 population are required- that would be a requirement of around 15 lakh doctors.

   Norm 1: 6 doctors per 10,000 population: 7.8 lakh doctors required (World Health Organization, 2006)

   Norm 2: 11 doctor per 10,000 population: 14.3 lakh doctors required (World Health Organization, 2016)

   The basis or rationale behind these norms is given in item 5 of Section III, Sub-Section A: Health Professionals- Requirements versus Availability on page 35.

   As against this requirement by norm 1, there is no shortfall, if we use to estimated number of doctors currently available as per study 1 (Hazarika, 2013). By the second norm, the shortfall is about 7 lakh doctors.

   Using the study 2 approach (Rao, Shahrawat, & Bhatnagar, 2016), the short-fall is around 4 lakh doctors by norm 1 and a big 11 lakhs by norm 2.

3. **Health Professionals- Requirements versus availability of Nurses**:
   According to World Health Report 2006, there were 8,65,135 nurses (8 per 10,000 population) and 5,06,924 Midwives (4.7 per 10,000 population) in India in 2004. (World Health Organization, 2006). The recent study published based on nursing council's data in 2013 (Hazarika, 2013), concludes that there were 20.8 skilled health workers per 10,000 population, of which 14.4 are nurses and mid-wives in the year 2009. This amounts to around 16,50,180 nurses and midwives.

   As per National Health Profile 2018, which uses data from professional councils, there were 19,80,536 Registered Nurses and Registered Midwives, 8,41,279 ANMs and 56,367 LHVs serving – a total of 28,78,182. These figures from professional registers have drawback of over-estimation. Post 2011, data is being reported as number of Registered Nurses and Midwives, ANMs and LHVs. By the Nursing Registration and Tracking system that was put

in place recently by Indian Nursing Council, only around 5,34,642 nurses have been enrolled in this live register as on 22nd April 2019- which is a serious underestimate.

The other major study that is cited is based on Census 2001 data. This study concluded that, there were only 6,30,406 nurses and midwives (30.5% of total health workers, including doctors). The density of nurses and midwives was 6.1 per 10,000 population and density of qualified nurses and midwives was 0.6 per 10,000 population (Anand & Fan, 2016).

The most recent study in this area is based on the National Sample Survey Estimates based on its 68th round on Employment and unemployment situation in India (2011-12). This study concludes that, the density of health workers was 20.9 (qualified 9.1) per 10,000 population, of which nurses and midwives density is 7.6 (qualified 3.1) (Rao, Shahrawat, & Bhatnagar, 2016). This translates to 9,19,600 nurses and midwives, out of which only 3,75,100 nurses and midwives were qualified.

4. **Distribution of Doctors and Nurses by State:**
When we look at the distribution, we find that it is highly skewed by both approaches to measurement referring to both reference study 1 and reference study 2. Comparing the results by the two approaches we find divergence between the two and with overall health systems performance- thus raising doubt on the reliability of both measures. However they are still valuable to understand the inequity across states.

Table 1.1.1: Density of doctors and nurses and all health workers per 10,000 population and as measured by two approaches: Study 1 register based and Study 2 census based- also Nurse to Doctor ratio (states listed in order of density of doctors by study 1 approach)

	Doctors		**Nurses**		**Combined (Nurses and Doctors)**		**Nurse: Doctor Ratio**
	Study 1	**Study 2**	**Study 1**	**Study 2**	**Study 1**	**Study 2**	**Study 1**
Goa	13.9	5.8	NA	0.7	NA	6.5	NA
Punjab	14.2	2.2	23.6	6.8	37.8	9.0	1.66
Karnataka	13.9	5.2	30.9	1.3	44.8	6.5	2.22
Maharashtra	12.3	8.7	11.5	4.2	23.9	12.9	0.94
Kerala	11.5	3.2	34.6	18.5	46.1	21.7	3.01
Tamilnadu	11.9	1.6	33.9	6.3	45.7	7.9	2.45
J&K	8.8	2.3	NA	1.8	NA	4.1	NA
Gujarat	7.7	1.4	21.2	13.1	28.9	14.5	2.77
Andhra +Telangana	7.5	2.3	29.9	1.9	37.4	4.2	3.99
West Bengal	6.5	3.5	11.7	0.8	18.2	4.3	1.8
INDIA	**6.4**	**3.4**	**14.4**	**3.2**	**20.8**	**6.6**	**2.24**
Delhi	5.7	7.5	18.1	1.4	23.6	8.9	3.19
Rajasthan	4.2	4.0	9.0	2.6	13.2	6.6	2.17
Odisha	4.1	1.3	27.3	1.0	31.3	2.3	6.71

NE/Assam*	3.9	-	8.8	2.0	12.6	-	2.26
MP	3.7	0.3	17.7	1.7	21.3	2.0	4.84
Bihar	3.6	0.3	1.6	0.4	5.2	0.7	0.45
Uttarakhand	3.1	6.8	0.8	4.7	3.9	11.5	0.29
Uttar Pradesh	2.9	6.2	2.5	0.5	5.4	6.7	0.87
Haryana	1.7	3.3	12.9	5.1	14.6	8.4	7.64
Chhattisgarh	1.1	3.6	2.4	2.3	3.5	5.9	2.13
Himachal	1.0	0.1	27.8	1.1	28.9	1.2	26.53
Jharkhand	0.9	0.7	1.7	1.6	2.6	2.3	1.84
Norm 1	**6.0**	**6.0**	**18.0**	**18.0**	**23**	**23**	**3.0**
Norm 2	**11.0**	**11.0**	**33.0**	**33.0**	**44.5**	**44.5**	**3.0**

Source: Study 1 : Hazarika, 2013, Study 2: Rao, Shahrawat, & Bhatnagar, 2016.
* NE- for Study 1 and Assam for study 2

Examining the above table, we find that all states with relatively better performance by infant mortality rate, have densities of HR as per both norms. The interesting exception is Himachal which has one of the lowest. But Himachal also has one of the lowest proportions of doctors in private sector.

We also note that three high performance states (Kerala, Tamil Nadu and Karnataka) have achieved the latest WHO norms for required HRH (by study 1 approach)- and one more, Maharashtra, has achieved this for doctors though falls short for nurses. If we go by the earlier norms almost all non-EAG states except Haryana and West Bengal have achieved desired norms, if we go by HRH estimates of the first study approach. Among the EAG states, only Odisha has achieved the desired norm 1 requirement. We discuss the short falls between available and required human resources in greater detail in section III.

5. Distribution within states: By District and by Rural- Urban Residence

This high degree of skew that we see across states is if anything more within states. Some states like Maharashtra have a much higher skew than states like Kerala. In the EAG states the skew is even more serious, for it can lead to only one doctor per 10,000 population – or even worse with even less qualified nurses.

Keeping only to the estimates of the distribution of qualified health workers, we know that the number of skilled health workers deployed in rural areas is far less than urban areas. By the study 2 (NSSO based) approach, qualified health workers was 22.7 per 10 000 population in urban areas, compared to 3.0 per 10 000 population in rural areas. Similarly qualified nurses and midwives are 5.5 times higher in urban areas and almost all dentists are in urban areas. (Rao, Shahrawat, & Bhatnagar, 2016)

Another study also shows the same trend but puts urban density for nurses and midwives as 4 times higher than the rural. Interestingly, the study also reports that, unlike other categories of health workers, education level and medical qualification of rural nurses and midwives was slightly higher than those of urban nurses and midwives. Moreover, the disparity between

urban and rural providers was less for nurses compared to allopathic doctors in majority of states (Anand & Fan, 2016). Register based approaches do not have details of urban and rural distribution, or distribution by region and sector.

6. Distribution across public and private sector:

To a large extent, the numbers and patterns of health workers and whether they are qualified or not depend on the pattern and extent of growth of the private sector in health and on public health expenditure as a proportion of total health expenditure. Over 87% of doctors in urban India and 83.5% of doctors in rural India work in the private sector. The private sector accounts for over 90% of AYUSH practitioners. The proportions for qualified providers alone would also favor the private sector. (Rao, Shahrawat, & Bhatnagar, 2016)

There is a difference when it comes to nurses. Among qualified nurses and midwives, a relatively lower proportion is privately engaged-about 48.8% in rural and 59.8% in urban areas (Rao, Shahrawat, & Bhatnagar, 2016). The register-based approach cannot comment on this, since this disaggregation is not available in the data collected, but this is the findings of the NSSO based approach.

7. Distribution by Specialization:

The short-fall in the availability of specialists and the poor distribution across states and within states is much more acute than of general duty medical officers. There are few reliable estimates of actual numbers available. The number of specialists generated by each state given in section II below- however gives us a picture.

Within this broad category of specialists, both the requirements and short-fall vary widely. Thus the short-fall in psychiatrists is one of the highest, but this extends to many other specializations also. Further the greater the short-fall, the more skewed the distribution across states and within states.

8. The AYUSH Practitioners

Data regarding AYUSH (Ayurveda, Yoga, Unani, Siddha and Homeopathy) practitioners is available from professional councils and this includes both public and private practitioners. As per Ministry of AYUSH report, there were around 7,73,668 registered AYUSH practitioners in 2017, which means the density of around 5.96 practitioners per 10,000 population. The varied density across the states is shown in table 1.1.2.

Table 1.1.2: Number of Registered AYUSH practitioners and Density per 10,000 population, in 2017 (States arranged in descending order of density of registered AYUSH practitioners)

	States	Ayurveda practitioners	Unani practitioners	Siddha practitioners	Naturopathy practitioners	Homoeopathy practitioners	Total AYUSH practitioners	Density-AYUSH practitioners per 10,000 population
1	Bihar	96,841	7,123	-	-	31,992	1,35,956	12.80
2	Maharashtra	76,465	6,833	-	-	64,538	1,47,836	12.03
3	Kerala	24,076	108	1,657	147	13,156	39,144	10.85
4	Nagaland	-	-	-	-	2,084	2,084	8.58
5	Himachal Pradesh	4,975	-	-	-	1,233	6,208	8.62
6	Madhya Pradesh	46,486	1,685	-	15	16,711	64,897	8.11
7	Gujarat	26,311	321	-	-	21,455	48,087	7.49
8	Karnataka	33,869	1,948	4	745	9,102	45,668	7.20
9	Goa	636	-	-	-	671	1,307	6.32
10	Punjab	11,135	211	-	-	4,411	15,757	5.32
11	Haryana	8,351	268	-	-	5,605	14,224	5.03
12	West Bengal	3,503	5,172	-	-	37,178	45,853	4.82
13	Andhra Pradesh & Telangana	26,858	5,466	-	437	10,056	42,817	4.77
14	J&K	2,937	2,498	-	-	388	5,823	4.60
15	Delhi	3,421	2,011	-	-	4,827	10,259	4.55
16	Uttar Pradesh	36,626	13,423	-	-	33,425	83,474	3.71
17	Odisha	4,846	25	-	-	9,645	14,516	3.37
18	Uttarakhand	2,806	129	-	-	726	3,661	3.36
19	Tamil Nadu	4,357	1,182	6,844	788	5,075	18,246	2.60
20	Arunachal	44	2	-	-	293	339	2.53
21	Rajasthan	9,762	983	-	8	7,810	18,563	2.48
22	Chhattisgarh	3,430	148	-	102	1,824	5,504	2.08
23	Meghalaya	-	-	-	-	334	334	1.18
24	Tripura	-	-	-	-	331	331	0.85
25	Chandigarh	-	-	-	-	156	156	0.80
26	Assam	1,002	-	-	-	1,160	2,162	0.65
27	Jharkhand	147	30	-	-	285	462	0.13
	India	**4,28,884**	**49,566**	**8,505**	**2,242**	**2,84,471**	**7,73,668**	**5.96**

* Data not reported from NE states- Manipur, Sikkim, Mizoram and UTs- A&N, Lakshadweep, Puducherry, DNH, Daman and Diu.

The NSSO 68th round based study also estimates that, there were 0.6 AYUSH practitioners (qualified) per 10,000 population, which means only 72,000 qualified practitioners in the

country during 2011-12. This represents less than 10% of total registered practitioners (7,85,185 in the year 2010). If unqualified practitioners were included, the density increased to 1.3, which means around 1,56,000 providers. (Rao, Shahrawat, & Bhatnagar, 2016). As per the study estimates using NSSO 68th round too, it was estimated that, the private sector accounts for over 90% of AYUSH practitioners (Rao, Shahrawat, & Bhatnagar, 2016).

Thus, based on these two sources of information we get a wide range of what are the numbers of AYUSH practitioners who are currently in practice. This ranges from 1.5 lakh to 7 lakh, with over 90% employed in private sector.

Another data source for private AYUSH practitioners is from NSSO 67th round on Unincorporated Non-Agricultural Enterprises (2010-11), which estimates that 2,09,438 establishments in private health sector were providing Ayurveda, Unani and Homeopathy services. Following table provides the details regarding establishments providing AYUSH services in private sector.

Table 1.1.3: Number of AYUSH Establishments in Private Health Services Activities

	Rural			Urban			Total		
	OAE	Est	All	OAE	Est	All	OAE	Est	**All**
Activities of Ayurveda practitioners	37,276	2,464	39,741	26,385	10,738	37,123	63,661	13,202	**76,863**
Activities of Unani practitioners	6,802	3,649	10,451	4,924	1,458	6,382	11,726	5,107	**16,833**
Activities of Homeopathic practitioners	55,788	3,554	59,342	38,169	18,231	56,400	93,957	21,785	**1,15,742**
Total	**99,866**	**9,667**	**1,09,533**	**69,478**	**30,427**	**99,905**	**1,69,344**	**40,094**	**2,09,438**

Total Own Account Enterprises (OAEs)[1] were reported to be 1,69,344 and Establishments[2] are 40,094. The number of providers can be estimated with an assumption of one provider per OAE and five providers per establishment. Table 1.1.3 A provides details of private sector distribution across states. By this approach we would get a total of 3,69,813 AYUSH practitioners in the nation. But what is of greater concern is that when we compare these numbers with what is available in the registers, it is clear that in some states there is a major over-estimation of the number of AYUSH providers currently practicing and in others the registers are incomplete and missing out many who are in practice.

[1] Own Account Enterprises (OAE)- An enterprise, which is run without any hired worker employed on a fairly regular basis (means the major part of the period when operation(s) of an enterprise are carried out during a reference period) , is termed as an own account enterprise.

[2] Establishment- An enterprise which is employing at least one hired worker on a fairly regular basis is termed as establishment. Paid or unpaid apprentices, paid household member/servant/resident worker in an enterprise are considered as hired workers.

(MoSPI, GoI, 2013, NSSO, 67th round, 2010-11, Economic Characteristics of Unincorporated Nonagricultural Enterprises (Excluding Construction) in India)

Table 1.1.3A Estimate of Number of AYUSH providers currently practicing in private sector, extrapolating from 67th round NSSO expressed as total number of providers in state professional council registers.

	States	Registered AYUSH practitioners 2017	AYUSH providers in private practice 2010-11	Percentage of registered practitioners identified as in private practice by NSSO 67th round
1	Bihar	1,35,956	22,110	16.3
2	Maharashtra	1,47,836	43,076	29.1
3	Kerala	39,144	17,536	44.8
4	Nagaland	2,084	NA	-
5	Himachal Pradesh	6,208	1,156	18.6
6	Madhya Pradesh	64,897	11,843	18.2
7	Gujarat	48,087	30,887	64.2
8	Karnataka	45,668	23,918	52.4
9	Goa	1,307	NA	-
10	Punjab	15,757	13,429	85.2
11	Haryana	14,224	14,111	99.2
12	West Bengal	45,853	43,679	95.3
13	Andhra & Telangana	42,817	7,329	17.1
14	J&K	5,823	NA	-
15	Delhi	10,259*	10,674	100+
16	Uttar Pradesh	83,474	70,961	85.0
17	Odisha	14,516	9,638	66.4
18	Uttarakhand	3,661	3,857	-100-
19	Tamil Nadu	18,246	6,586	36.1
20	Arunachal	339	5	0.01
21	Rajasthan	18,563	6,834	36.8
22	Chhattisgarh	5,504	2,281	41.4
23	Meghalaya	334*	287	85.9
24	Tripura	331*	15,912	-
25	Chandigarh	156*	385	-
26	Assam	2,162*	7,706	-
27	Jharkhand	462*	5,476	-
28	Manipur	NA	80	-
29	Sikkim,	NA	NA	-
30	A&N	NA	NA	-
31	Puducherry	NA	NA	-
32	D and H	NA	NA	-
33	Daman and Diu	NA	55	-
34	Mizoram	NA	NA	-
	India	**7,73,668**	**3,69,813**	

*Poorly functional registration systems: Source: NSSO 67th round (2010-11) for AYUSH practitioners in private sector

AYUSH practitioners are providing services in the public sector. Broadly these can be categorized into those in AYUSH stand-alone facilities which are supported by state government funds and those introduced under NHM, the latter being in co-located facilities in Primary Health Centres (PHC), Community Health Centres (CHC) and District Hospitals (DH).

As per NHM quarterly report (status as on 31.12.2018), total 27,547 AYUSH doctors (11,883 under co-located facilities and 15,664 under RBSK) have been deployed under NHM (MoHFW, 2019).

Latest data regarding AYUSH standalone facilities (which are usually outside and additional to those funded by NHM) is available for the year 2010, from Ministry of AYUSH website. There were 23,432 dispensaries and 3,176 hospitals across the country in 2010. The availability of AYUSH practitioners at these facilities is estimated assuming one provider per dispensary and five providers per hospital. Thus, there were approximately 39,312 AYUSH practitioners at standalone facilities in 2010. Details of state wise availability in public sector are provided in Table 1.1.4. Adding those under NHM and those in standalone facilities we get an estimate of 66,859 AYUSH providers in public service.

Assuming there were no major changes in number of standalone facilities in the period- 2010 to 2017, total number of AYUSH practitioners in public health facilities are estimated for the year 2017-18. The state wise variation in the percentage of all registered practitioners who are now serving in public health facilities is provided in Table 1.1.4.

Table 1.1.4: AYUSH practitioners- Public sector distribution across states, 2017-18

	States	Registered AYUSH practitioners 2017	AYUSH practitioners under NHM (RBSK+ collocated) 2018	AYUSH practitioners in AYUSH standalone facilities 2010	Total AYUSH Providers in Public Health Facilities	Percentage of registered practitioners in Public Health Facilities
1	Bihar	1,35,956	2,830	764	3,594	2.64
2	Maharashtra	1,47,836	2,518	1,019	3,537	2.39
3	Kerala	39,144	740	2,241	2,981	7.62
4	Nagaland	2,084	61	202	263	12.62
5	Himachal Pradesh	6,208	303	1,262	1,565	25.21
6	Madhya Pradesh	64,897	1,134	1,873	3,007	4.63
7	Gujarat	48,087	2,363	1,093	3,456	7.19
8	Karnataka	45,668	1,474	1,494	2,968	6.50
9	Goa	1,307	79	26	105	8.03
10	Punjab	15,757	530	749	1,279	8.12
11	Haryana	14,224	625	572	1,197	8.42
12	West Bengal	45,853	1,712	1,917	3,629	7.91
13	Andhra & Telangana	42,817	714	1,890	2,604	6.08
14	J&K	5,823	889	528	1,417	24.33
15	Delhi	10,259	-	425	425	4.14

16	Uttar Pradesh	83,474	4,202	11,924	16,126	19.32
17	Odisha	14,516	2,188	1,340	3,528	24.30
18	Uttarakhand	3,661	377	580	957	26.14
19	Tamil Nadu	18,246	475	2,058	2,533	13.88
20	Arunachal	339	-	-	-	-
21	Rajasthan	18,563	1,694	4,503	6,197	33.38
22	Chhattisgarh	5,504	540	1,535	2,075	37.70
23	Meghalaya	334	227	104	331	99.10
24	Tripura	331	154	144	298	90.03
25	Chandigarh	156	32	25	57	36.54
26	Assam	2,162	661	476	1,137	52.59
27	Jharkhand	462	564	221	785	169.91
28	Manipur	-	173	246	419	-
29	Sikkim	-	14	7	21	-
30	A&N	-	33	35	68	-
31	Puducherry	-	47	59	106	-
32	D and H	-	12	-	12	-
33	Daman and Diu	-	8	-	8	-
34	Mizoram	-	58	-	58	-
	India	**7,73,668**	**27,431**	**39,312**	**66,743**	**8.63**

Sources: MoHFW (2019) - Quarterly NHM MIS report for AYUSH practitioners under NHM
Ministry of AYUSH website, 2019 for AYUSH practitioners in standalone facilities (2010)

As can be observed from the table, approximately 8-9% of registered AYUSH practitioners are employed in the public health facilities.

9. Associate and Other Health Professionals

Till now, doctors and nurses have been discussed. These account for either the 23 skilled health workers (by norm 1) or 44.5 skilled health workers (by norm 2) requirement. Apart from these, there is a category of Other Health professionals and Associate health Professionals which together are also referred to as allied health professionals. This includes dentists, pharmacists, physiotherapists, Dieticians and nutritionists, technicians related to speech and eyesight and occupational therapists, audiologists and speech therapists. (Annexure I). These are also Medical imaging and therapeutic equipment technicians, laboratory technicians, dental assistants, medical records and health information technicians, data entry operators, clinical coders and social work and counseling professionals: HIV counselor, Family planning counselor, NCD counselor, Adolescent Health Counselor, social work, de-addiction workers, health navigator, etc. (See Annexure 1) Of these the largest groups are dentists and pharmacists and then laboratory technicians and increasingly health information technicians.

The estimated availability of pharmacists is approximately one million as reported by the Pharmacy Council of India, dentists are estimated to be 2,71,760, as reported by the Dental Council of India and there are about 10 lakh of the other allied or associate healthcare workers. Given the lack of a statutory body thus far, the only data that we have in this regard are those as reported from professional associations. According to these sources, there are currently,

approximately 22.7lakh associate and other health professionals are available, which translates to 17 associate and other health professionals per 10,000 population.

10. Frontline Health Workforce: workers at the community interface

This section of workforce is almost exclusively in the public sector, with some minor supplementation in the not-for-profit sector. These include male and female multi-purpose health workers, ASHAs and emergency medical technicians.

The female multi-purpose health worker is synonymous with the ANM- which is the formal qualification as also the term by which she is commonly referred to. There is an overlap with the category of nurses-midwives, since this is essentially a reduction of the 4 or 3 year nurse degree and diploma training program into what was then a more pragmatic 18 month certificate course and 6 months internship. The numbers of such workers are discussed with the nursing cadre. The important factor to note is that in many states she is no longer called onto perform midwifery roles, whereas in other states, that role still remains relevant.

The situation around the male multipurpose worker is characterized by confusion – on all elements. Once declared a dying cadre, it continues to survive without adequate clarity on roles and accountability, support or training. By the guidelines and Indian Public Health Standards, (IPHS), there should be at least one per health sub-center which is about 1.5 lakhs of such employees in place. In practice there would be about one-third as much- inclusive of supervisors.

The single largest component of what the front-line health workforce is the ASHA worker of which we have close to one million as of now. Only Tamilnadu and Goa do not have universal presence of ASHAs as of now. Urban areas are significantly under-represented. The remarkable fact about this program is that it is only about 12 year's old- and yet its rise and contribution have been immense. Before and in parallel to the CHWs, many other community health cadre have been tried- Village health guide, jan swashtya rakshak, arogyamitra and so on- but none have anywhere near the success that the ASHA has. Many evaluations conclude that it is the right combination of facilitatory, service provider and activist role that has contributed to its success.

One other major occupation that has emerged is the emergency medical technician - thanks to the 108 services and its expansion. Private ambulances services also have such technicians in place- but seldom with a distinct training, certification and support.

11. Mid-Level Healthcare Providers:

This is a relatively new and emerging category of providers with considerable diversity within. They are defined by having clinical skills above that of the multipurpose worker and the nurse but less than that of the doctor. There are two distinct formats- one which has emerged in the public sector and one which is wedded exclusively to the private sector.

In the public sector, one early example is the rural medical assistant of Chhattisgarh that is about a few hundred strong, and is providing primary healthcare in most of the state government PHCs. Further production of this cadre was however halted over 10 years back-

and despite many efforts have not resumed. A very similar effort, the community health practitioner has taken off in Assam, and is limited to one course in one medical college. However this has been consistent in turning out graduates, who are staffing the states' health sub-centers with considerable success.
Learning from these examples the central government proposed to introduce a three year B.Sc course in community health practitioner- a mid-level care provider course. However due to resistance from different professional associations this has not taken off. What has taken off is a 6 month program for nurses and for AYUSH care providers which equips them to play a mid-level healthcare provider role (MLHP). This is the role of a primary healthcare provider with both a clinical role and public health functions. A number of such programs are under way, and its impact needs to be watched. Government commitment is to create a workforce that could be over 1,00,000 strong.

Meanwhile and completely parallel to the above, is the development of a physician assistant cadre – exclusively in the private sector and for hospitals. This a four year course, of which three years are in class room learning and the rest is rotational postings in the hospital. This program that began in 1992, is recognized and supervised by the Tamilnadu government medical university, there are now over a 1000 graduates who are in practice- mostly in the four southern states. The courses are conducted in larger private hospitals. These PAs are also non-physician clinical care providers and they undertake tasks like history taking, examination, clinical notes, discharge summaries, dispensing care etc. Formally they do not undertake diagnosis and prescription- but in practice this role too is very much there. (Kuilman & Sundar, 2015)

12. Unqualified Health Workers:

The other major feature of India's human resources for health is the large presence of unqualified providers in India's health workforce. Overall, accordingly to NSSO based study estimate there are 1.4 million unqualified health workers in India, representing 56.4% of the health workforce (Rao, Shahrawat, & Bhatnagar, 2016). The weighted estimates of the unqualified workers are as follows: 42.3% of allopathic doctors, 58.4% of nurses and midwives, 27.5% of dentists, 56.1% of AYUSH practitioners, and 69.2% of health associates.

The proportion of health workers who are not qualified is 71% in rural areas and 49% in urban areas. In rural areas 69% of doctors, 68 % of nurses and midwives, 63 % of dentists, 74 % of AYUSH practitioners, and 76 % of health associate workers are unqualified. In urban areas, it is about 31 % of allopathic doctors, 53% of nurses, 26% of dentists, 44 % of AYUSH practitioners, and 66 % of health associates (Rao, Shahrawat, & Bhatnagar, 2016).

13. Support Personnel in Health Services:

This list includes health workers who have no training or need only minimal training and act largely as unskilled labor support. For example Nursing aides, Patient care assistant, Ward Boy, Phlebotomist. There are also a number of workers whose tasks relate to one of the following- sanitation and hygiene, security, dietary arrangement, laundry, driving, civic maintenance,

mechanics, electricians and such like. Another major category of workers are all the clerical and accounting staff at different skill levels and functions who are essential for the smooth functioning of a hospital or a public healthcare system. Though these are often discussed as non-productive staff additions when discussing public sector performance, they are essential. Further if well paid and supported and managed, they make a huge difference to quality of care.

14. Health Management Personnel:

Health Service Managers and management personnel would include all non-medical and medical administrators- from administrative positions at state/national level, to facility administrators and senior management, to cadre managers like nurse matron, public health managers, and those whose work is entirely supervision. As a proportion of all staff, those involved only or mainly in administration would be less than 5 %, often as close to 2%. Of all employees. However in systems based on purchasing of care this could rise to as high as 20%. Professionalizing Public Health Management and Hospital Management has been discussed at length- and the creation of a public health cadre is one aspect of this topic. A new set of administrators with qualifications in public health management and/or hospital management has been rapidly emerging and there are now over a 50 institutes offering such courses. This is discussed at some length in recent publications. (Sundararaman & Parmar, 2019)

15. Life science professionals:

These would include in the least bacteriologist, Biotechnologist, Microbiologist, Molecular biologist, Molecular geneticist, entomologists,, Water quality analysts; public health laboratory specialists, Bio Medical Engineers and Environmental engineer. It would also include a range of public health specialists- Epidemiologists, Sociologists, Health economists, Health policy analyst, bio-statistician, anthropologists etc. The whole area of those involved in health research- who do not fall into any of the first 14 categories- doctors, nurses, associate health professionals etc- also come into this category. Here the challenge is not in the numbers generated, but in the quality of those generated and how they are deployed and accessed to provide feedback and guidance to health systems.

In Summary:

Human Resources for health cover a vast range of skills and respond to a vast variety of needs. Thus in most developed nations they could constitute as much as 10% of the entire workforce, which is consistent with healthcare accounting for about the same per cent of the GDP in these nations. The G20 which is a mix of developed and emerging economies has an average of 8% of the workforce being constituted by human resources for health. In India the proportion is likely to be less than 2%.

An increase in human resources for health must be proportional to the skills required and distributed as per needs. Currently there is an over-emphasis on doctors and a neglect of distributional issues. For every doctor employed we need three of the nursing category and three more of other categories of professionals and workers. There are also many categories of health workers emerging whose work profile and potential is not clear- and there is need to rationalize the existing patterns of generation and deployment of work force.

Section II: Generation of Human Resources

Generation of Doctors:

The numbers generated across states for doctors and specialists is given in table 1.2.1 below.

Table 1.2.1: Seats for MBBS and PG in medical specialty by state (Year: 2017)

	State	Government	Private	Total MBBS seats	Total PG seats*
1	Andhra Pradesh	1900	2850	4750	1782
2	A&N	100	0	100	-
3	Assam	726	0	726	518
4	Bihar	950	400	1350	600
5	Chandigarh	100	0	100	546
6	Chhattisgarh	650	450	1100	119
7	Delhi	900	200	1100	2525
8	Goa	150	0	150	107
9	Gujarat	2830	1000	3830	1962
10	Haryana	600	850	1450	468
11	HP	500	150	650	223
12	J&K	400	100	500	434
13	Jharkhand	350	0	350	215
14	Karnataka	2650	6195	8845	3960
15	Kerala	1350	2800	4150	1415
16	MP	800	1800	2600	845
17	Maharashtra	3050	4220	7270	3820
18	Manipur	200	0	200	201
19	Meghalaya	50	0	50	22
20	Odisha	850	500	1350	646
21	Puducherry	150	1050	1200	618
22	Punjab	500	775	1275	702
23	Rajasthan	1450	1200	2650	1398
24	Sikkim	0	100	100	22
25	TN	3250	3600	6850	2960
26	Telengana	1100	2650	3750	1622
27	Tripura	200	0	200	30
28	UP	2199	4150	6349	2002
29	UK	350	450	800	212
30	WB	2150	550	2700	1441
31	AIIMS	707	0	707	-
32	JIPMER	150	0	150	-
	TOTAL	**31,312**	**36,040**	**67,352**	**31,415**

* PG seats include seats for MD/MS, MCH, DM and Diploma

Source: Ministry of Health and Family Welfare: Annual Report-2017-18

Since states very widely in population, the above table does not give us an adequate idea about the short-fall in the number of seats by state**.** The following table- 1.2.1 A gives a better understanding of this.

Table 1.2.1 A- Seats for MBBS and PG in medical specialty per lakh population (Projected population for 2018) in states (States ranked in ascending order of density of MBBS seats per lakh population)

	State	Govt. MBBS Seats	Private MBBS Seats	Total MBBS Seats	PG seats*	MBBS Seat Per Lakh Population	PG seats per lakh Population
1	Jharkhand	350	0	350	215	1.01	0.62
2	Bihar	950	400	1350	600	1.27	0.57
3	Meghalaya	50	0	50	22	1.77	0.78
4	Assam	726	0	726	518	2.19	1.56
5	UP	2199	4150	6349	2002	2.82	0.89
6	WB	2150	550	2700	1441	2.84	1.52
7	Odisha	850	500	1350	646	3.13	1.50
8	MP	800	1800	2600	845	3.25	1.06
9	Rajasthan	1450	1200	2650	1398	3.54	1.87
10	J&K	400	100	500	434	3.95	3.43
11	Chhattisgarh	650	450	1100	119	4.15	0.45
12	Punjab	500	775	1275	702	4.30	2.37
13	Delhi	900	200	1100	2525	4.88	11.21
14	Tripura	200	0	200	30	5.12	0.77
15	Haryana	600	850	1450	468	5.13	1.66
16	Chandigarh	100	0	100	546	5.15	28.13
17	Total	31312	36040	67352	31415	5.19	2.42
18	Maharashtra	3050	4220	7270	3820	5.91	3.11
19	Gujarat	2830	1000	3830	1962	5.96	3.06
20	Goa	150	0	150	107	7.25	5.17
21	UK	350	450	800	212	7.35	1.95
22	Manipur	200	0	200	201	7.56	7.60
23	HP	500	150	650	223	9.02	3.09
24	TN	3250	3600	6850	2960	9.78	4.23
25	Kerala	1350	2800	4150	1415	11.51	3.92
26	Andhra & Telangana	5150	6450	11600	4742	12.93	5.29
27	Karnataka	2650	6195	8845	3960	13.94	6.24
28	Sikkim	0	100	100	22	15.15	3.33
29	A&N	100	0	100	0	17.39	0.00
30	Puducherry	150	1050	1200	618	66.74	34.37

* PG seats include seats for MD/MS, MCH, DM and Diploma

The above table not only shows a very high skew in the number of seats per lakh population, it also show a high concentration of seats in a few southern states. Of greater concern is the fact that some of the states which have highest deficits of human resource like Madhya Pradesh, Uttar Pradesh have most of the seats in the private sector, and it is not clear as to what

proportion of these would seek government jobs or consider private employment in under-serviced areas. In the southern states too, the requirements for doctors are increasingly met from the output of private medical colleges, though government colleges also have outputs that are high enough to provide the human workforce that public services require.

Generation of nurses and midwives:

The numbers generated across states for nurses and midwives is given in table 1.2.2 below. (The data is obtained from Indian Nursing Council website). Details regarding the type of the institute in which they are employed- government or private, are not provided in the recent report on INC website. Density of institutes is less in EAG states, moreover the generation of nurses with higher qualifications like BSc, MSc is comparatively less in these states.

Table 1.2.2: State wise number of seats in recognized institutes for nurses and midwives (2019)

	State	ANM	GNM	BSc	MSc	P BSc
1	Andhra Pradesh	1,455	10,877	12,315	488	825
2	Bihar	2,940	1,041	470	-	70
3	Chhattisgarh	210	2,925	4,430	424	525
4	Goa	100	-	150	25	10
5	Gujarat	3,550	5,865	4,175	334	480
6	Haryana	2,720	3,270	1,755	242	750
7	Himachal Pradesh	180	1,440	1,020	101	220
8	J&K	340	575	780	45	120
9	Jharkhand	1,960	995	360	17	120
10	Karnataka	190	19,169	16,270	3,165	6,255
11	Kerala	170	3,785	6,985	973	1,170
12	Maharashtra	9,680	6,910	2,565	650	1,435
13	MP	2,615	13,775	7,170	918	1,690
14	Odisha	3,905	3,045	1,400	272	270
15	Punjab	5,400	9,928	5,240	652	2,875
16	Rajasthan	470	8,095	8,085	480	1,175
17	Tamilnadu	1,090	7,025	10,220	1,715	2,145
18	Telangana	495	3,942	4,540	434	280
19	Uttar Pradesh	7,100	10,940	3,860	364	890
20	Uttarakhand	595	1,215	1,070	149	210
21	West Bengal	400	3,620	1,260	232	465
	North-East states					
22	Arunachal	160	210	40	-	-
23	Assam	1,003	2,094	660	92	115
24	Manipur	230	470	240	16	20
25	Meghalaya	65	255	90	10	30
26	Mizoram	100	140	95	-	-
27	Nagaland	60	130	40	-	20
28	Sikkim	20	50	170	25	-
29	Tripura	185	220	180	22	20
	UTs					
30	Andaman and Nicobar	20	20	-	-	-

31	Chandigarh	-	-	95	20	40
32	Dadra and Nagar Haveli	-	-	60	20	20
33	Daman and Diu	-	-	50	-	-
34	Delhi	320	795	649	123	100
35	Pondicherry	100	290	875	142	185
	Total	**47,828**	**1,23,111**	**97,364**	**12,150**	**22,530**

Source: Indian Nursing Council website, 2019

Generation of Associate Health Professionals and Other Health Workers:

This report does not go into a review of the number of educational institutions and seats among dentists, pharmacists, physiotherapists, occupational therapists, laboratory technicians and assistants and counselors in each of the states.

It has also not addressed the institutions available and their capacity for generation of skills related to public health management and hospital management.

A few general overview statements can however be advanced. Firstly the same mismatch between needs, shortfalls and number of graduates in each of these areas of practice as is present for doctors and nurses is present in these professions also. The big difference is that professional councils in these skill areas are not as restrictive of expansion, and this can enable expansion of education and training institutions to those areas where they are most required. But also because there are no professional councils, the systems of quality assurance and regulation for these institutions are almost non-existent. Though there are some institutions running exemplary courses in these areas, there could be many who have almost no infrastructure, no regular curriculum, inadequate capacity to teach- and above all, almost no practical exposure which is mentored or guided by experienced professionals in these areas. Being in the nature of technical hands-on skills the lack of such practical training makes for a very poor quality output.

Section III: Policy Options and Recommendations for HR

In the first sub-section (A) we first present the number of doctors required and number and distribution of medical seats that are required. Then, we present the number of nursing staff required and the number and distribution of nursing seats that are required

Then in the second sub-section (B) we present the financial resource requirements for this degree of generation and deployment of human resources.

Then in the third sub-section (C) we present the policy options that are available to ensure that the additional seats created lead to effective closure of the HR gaps in the areas where deficits exist. And then we have a fourth brief sub-section (D) dealing with the issue of specialist gaps

Sub-Section A: Health Professionals- Requirements versus Availability

I. Doctors

1. With regard to numbers and distribution, there is a shortfall in human resources for health- but this is skewed across states and within states. We develop an approach to estimating the numbers for each category- doctors, nurses and others - available, required in the workforce. Based on this, we estimate the number of seats that need to be created. In this section, we first discuss this with respect to doctors- and then we present the data on nursing staff and finally on "the others".
2. To have the right numbers and distribution, a system needs to review policies across the whole employment cycle. This cycle can be described as shown in figure 1.3 below. We have not calculated the number of persons in each of these cells in the figure below, but good planning should attempt to do this at the state level for each category of employees. In this section we present an analysis of the gaps or shortfalls between availability and requirement and the numbers being generated with respect to doctors and nurses.

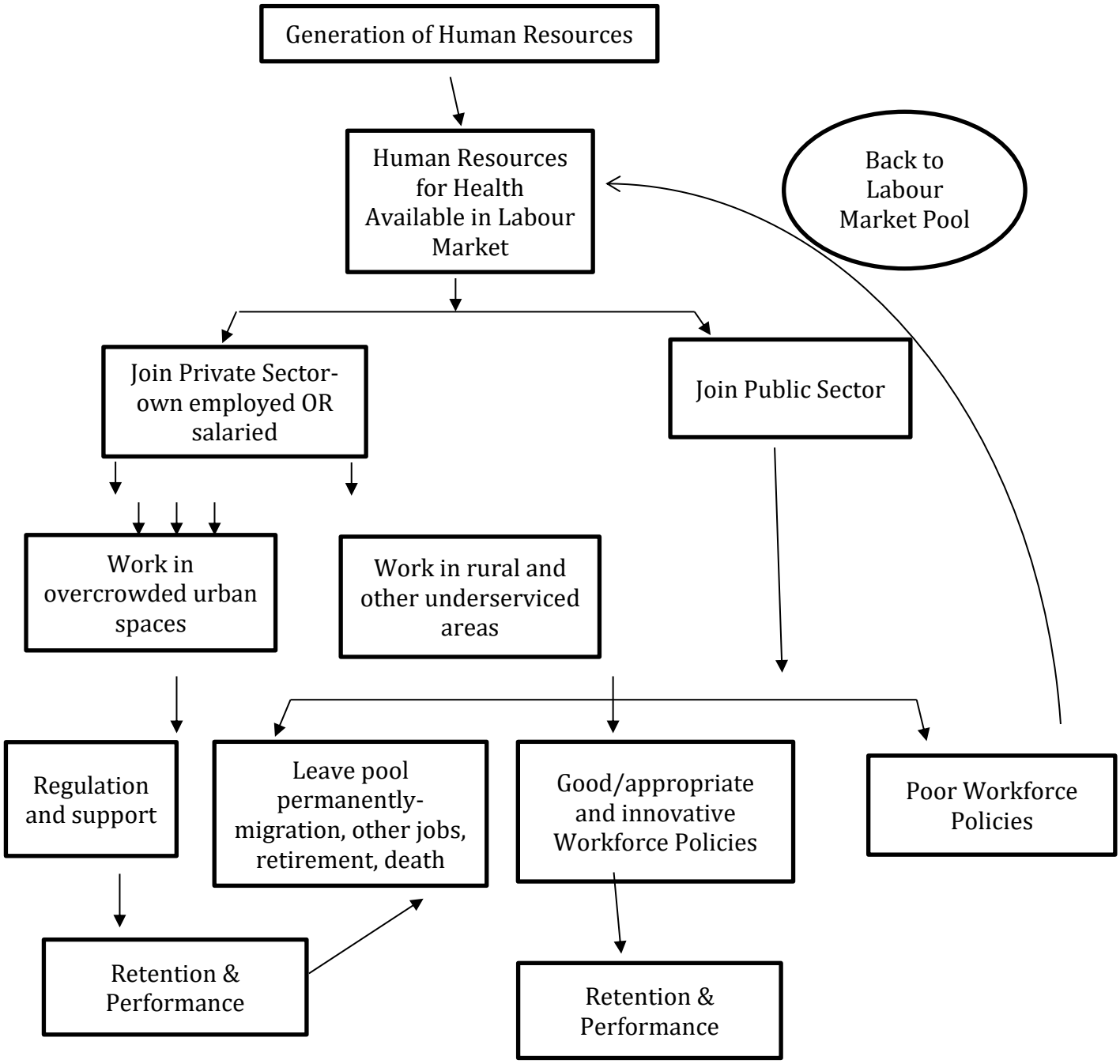

Figure 1.3: Human Resources for Health- Employment Cycle

3. Since the numbers available as of now varies across estimates and the numbers required varies across two norms, the numbers required to close the gap would also vary with the combination of estimate and norm used.

4. **Assessing Availability**: The two estimates for assessing numbers available are
    a) Study 1 approach- based on professional registers (Hazarika, 2013) and
    b) Study 2 approach- based on NSSO 68th round of Employment and Unemployment situation in India (Rao, Shahrawat, & Bhatnagar, 2016).
    These two study approaches have been discussed in section I.
5. **Assessing Requirements**: The numbers of doctors and nurses required is estimated as per as per two WHO norms which are presented below- along with their rationale and references:
    a) Norm 1: 23 health professionals per 10,000 population (6 doctors and 17 nurses, midwives)- Basis- WHO recommendation 2006 based on selective healthcare. A cross nation study showed that nations which achieved 80% coverage with immunization and care in pregnancy had at least 23 skilled professionals per 10,000 population (World Health Organization, 2006)
    b) Norm 2: 44.5 health professionals per 10,000 population (11 doctors and 33 nurses, midwives)- Basis -WHO recommendation 2016, based on relatively more comprehensive healthcare approach. A cross nation study showed that nations which achieved 80% coverage for a basket of ten tracer indicators which includes chronic non-communicable diseases had at least 44.5 skilled professionals per 10,000 population (World Health Organization, 2016)
6. **Estimating Additional Seat Requirements**: Now we need to estimate (a) the number of seats for doctors required to close the gap in 5 years and (b) the number of seats required after closing the gap. We call the latter the "replacement level". We propose two ways of approaching this- which we call design principle 1 and design principle 2. These could also be two stages in closing the gap. Both these approaches have to be followed according to requirements as estimated by Norm 1 and Norm 2.

Design Principle 1 (stage 1)- To arrive the number of doctors required to close the gap in 5 years:

D1 = Availability of doctors at the end of 5 years = Current availability (Plus) current yearly addition of doctors over five years (Minus) 10% attrition rate over five years.

DN1 = Requirement of doctors (as per Norm 1)
DN2 = Requirement of doctors (as per Norm 2)

G1: Gap in 2024 (as per Norm 1) = DN1 – D1
G2: Gap in 2024 (as per Norm 2) = DN2 – D1

ASR1: No. of Additional Seats Required to be added (as per Norm 1) = G1 / 5
ASR2: No of Additional Seats Required to be added (as per Norm 2) = G2 / 5

Design Principle 2 (stage 2) – Estimate the "Annual Replacement Level" which is the number of seats required after closing the gap; In the exercise, the annual replacement level is calculated using only norm 2 requirement

Annual Replacement Level (ARL) = 5% of DN2

ASR 3: Additional Seats Required to be added to achieve ARL = ARL minus Currently Available Seats (CAS) / No of years in which it is to be achieved

7. The states will thus have a range of options for increasing the capacity of generation. There will be a minimum requirement for addition of seats to achieve norm 1 in 5 years which is given by ASR 1 and it can be further extended to achieve the replacement level of norm 2 requirement which is ASR 2 within five years if that is possible. In the long term the goal is defined by ASR3, which some states can take as a five-year goal, and some would take 10 years or more to achieve. Some states would find that if they aim for achieve ASR 1 or ASR 2, they would have already achieved or even surpassed their requirements as per ASR 3. Some states can do it in two stages – achieve ASR 1 or ASR 2 in five years and then plan for ASR 3.
8. Based on this principle of design, we estimated the current capacity of the states to generate human resources for health (D1) and how many additional seats they should plan for to reach the target number as defined by norm 1 (ASR 1) or norm 2 (ASR 3) . In doing so our central concern is that any expansion in medical seats is state and within states region/cluster specific. There is nothing more dangerous to the state of our health system then if we add seats where they are not required or already in surplus while leaving under-serviced areas to their fate. This would be a wastage of scarce public resources for health that this country can ill afford. The analysis of the states as per these principles of design leads us to categorizing states into 5 groups. This is shown in table 1.3.1 below:
    - Group 1: States which have achieved requirements by norm 1 and norm 2 and generate more than required 'replacement' as per norm 2. (ASR 3 is zero or a negative value). Here the recommendation is to cap the number of medical/nursing seats, and focus only on quality and re-distribution within.
    - Group 2: States which have achieved norm 1 requirement, but not norm 2, but they are generating more than required 'replacement' as per norm 2 (ASR 1 would be zero, ASR 2 would be positive value, but ASR 3 is zero or a negative value) Here also the recommendation is to cap the number of doctor/nursing seats, and focus on quality and re-distribution within. The difference from group 1 is that they may take longer than 5 years to reach norm 2 level of the workforce. They could purchase seats from states with surplus seats to close the gap earlier, or deploy mid-level care providers as an interim measure. But even if they took no action, their gaps would be minimal and they would achieve norm 2 within 10 years.
    - Group 3: States which have achieved norm 1 (ASR 1 is zero) requirement and generate less than required to achieve norm 2 within 5 years (ASR 2 is positive

value). Their number of seats is less than what is required for replacement levels.(ASR 3 is also positive value) These states could add more seats.

- Group 4: States which have *not* achieved even norm 1 requirement by 2024 though their current number of seats are more than the optimal- 'replacement' level. Therefore no further additional seats are recommended. These are states that have recently added considerable capacity/seats- and would reach their targets for HR requirements by norm 1 a few years later and norm 2 in another 5 or 6 years. (ASR 1 and 2 are positive values, but ASR 3 is zero)
- Group 5: States which will not achieve even norm 1 requirements by 2024 and whose number of seats are much below that required for achieving norm 1 by 2024 or achieving the required 'replacement levels'. These are the crisis states. Almost all of the EAG states are part of this group. (here ASR 1, ASR 2 and ASR 3 are all positive values)

Table 1.3.1: Availability of doctors as per professional council's data (study 1) and projections for 2024

	Groups	State	Availability (2011)	Req: Norm 1 (DN1)	Req: Norm 2 (DN2)	Current available Seats (2018) (CAS)	In 5 years doctors Available (D1)	Gap 2024 by norm 1 (G1)	Gap 2024 by norm 2 (G2)	#A: ASR 1	#B: ASR 3
1	Group 1	Goa	2,027	875	1,604	150	2575	* (-1700)	* (-970)	-	-
2		Punjab[a]	40,894	17,279	31,679	1375	43680	* (-26,401)	* (-12,001)	-	-
3		Karnataka	84,922	36,657	67,205	8845	120655	* (-83,998)	* (-53,540)	-	-
4		Maharashtra	1,38,220	67,425	1,23,612	7270	160748	* (-93,324)	* (-37,137)	-	-
5		Kerala	38,417	20,044	36,747	4150	55325	* (-35,282)	* (-18,579)	-	-
6		Tamil Nadu[b]	88,568	44,656	81,870	8150	120461	* (-75,805)	* (-38,592)	-	-
7		Andhra Pradesh	63,436	50,748	93,039	8500	99,592	* (-48,844)	* (-6553)	-	-
8	Group 2	Gujarat	46,539	36,264	66,484	3830	61035	* (-24,771)	5,449	-	-
9		Delhi	7,051	10,073	18,467	1100	11846	* (-1,773)	6,621	-	-
10		Uttarakhand	3,127	6,052	11,095	800	6814	* (-762)	4,281	-	-
11	Group 3	J&K	11,036	7,525	13,795	500	12433	* (-4,908)	1,363	-	190
12		West Bengal	59,329	54,766	1,00,404	2700	66897	* (-12,131)	33,507	-	2320
13	Group 4	Haryana	4,310	15,211	27,887	1450	11129	4082	16,758	816	-
14		Himachal Pradesh	686	4,119	7,551	650	3868	251	3,683	50	-
15	Group 5	Rajasthan	28,790	41,129	75,403	2650	39,161	1968	36,242	394	1120
16		Odisha	17,209	25,185	46,172	1350	22,238	2,946	23,933	589	959
17		North-East[d]	17,851	27,463	50,349	1276	22,446	5,017	27,903	1003	1241
18		MP	26,872	43,576	79,889	2600	37,185	6,391	42,705	1278	1394
19		Bihar	37,476	62,460	1,14,509	1350	40,478	21,981	74,031	4396	4375
20		UP	57,946	1,19,887	2,19,794	6349	83,896	35,991	1,35,898	7198	4641
21		Chhattisgarh	2,810	15,327	28,100	1100	8,029	7298	20,071	1460	305
22		Jharkhand	2,969	19,793	36,287	350	4,422	15,371	31,865	3074	1464
Totals (Aggregate)		**India**	**7,74,947**	**7,26,513**	**13,31,940**	**66,495**	**10,29,927**	*** (-3,03,414)**	**3,02,013**	**-**	**102**
Actual gap and requirement		**India**						**1,01,297**	**4,64,309**	**20,259**	**18,010**

* - excess
a: includes Chandigarh, b: includes UTs, c: includes Telangana, d: includes all north-east states
A: ASR 1: Additional seats required in year 1 (2019) to reach norm 1 by 2024
B: ASR 3: Additional seats required in year 1 (2019) to reach optimal level (i.e. replacement levels taken as 5% of requirement by norm 2).

9. The interpretation of the above table (Table 1.3.1) would be as follows:
    a. No further seats are required in all of group 1 (Goa, Punjab, Maharashtra, Kerala, Karnataka, Tamilnadu (including Pondicherry) and Karnataka) or in group 2 (Gujarat, Delhi, Uttarakhand). Though the group 2 states would have a small gap by norm 2, they could close this gap within the next 7 to 10 years, with current capacity of generation. (Table 1.3.2)
    b. Group 3 states of Jammu and Kashmir would also with current capacity achieve the norm 2 requirement within 8 years. West Bengal requires to increase seats as the gap would remain large even after 5 years- and at current generation rate, the state will achieve norm 2 in additional 12 years. Since its replacement level is 5020 seats it could increase its current generation by as much as 2320 seats. Even then there would be a gap of around 20,000 after five years. Mid-level health providers could fill this gap. It is not advised to increase generation capacity beyond the replacement level can as this could result in excess doctors over a long term period – and anyway even the current proposal for expansion would be challenging.
    c. For states in group 4, the number of seats created is more than the optimal needed for replacement, but the current gap is so large that by 2024 they would not have achieved norm 1. However they would achieve norm 1 by 2027 and norm 2 by 2031. These gaps could also focus on quality and re-distribution and gap filling with mid-level health providers. Workforce policies need to be strengthened in these states for increasing availability of doctors within the state.

Table 1.3.2: Year of achieving norm 1 and norm 2 for doctors in group 2, 3 and 4 states by current capacity for generation

Year by which the norm can be achieved	Norm 1	Norm 2
2025	Himachal Pradesh	
2026		Gujarat
2027	Haryana	Jammu and Kashmir
2029		Uttarakhand
2030		Delhi, Himachal Pradesh
2031		Haryana
2036		West Bengal

d) For group 5, a five year time line is not meaningful as the gaps are large. For these states, a timeline of 10 years can be considered for progressing towards norm 2 requirements (see table 1.3.3). For these states, addition of seats to achieve norm 2 by 2029 would be

more feasible and it also falls within the SDG achievement year of 2030. For the states in group 5, mid-level health providers would fill in the gap in the interim years.

Table 1.3.3: Availability of doctors as per professional council's data and projection for 2029 for the EAG (group 5 states)

	State	Current Availability	Requirement-Norm 1	Requirement-Norm 2	Current generation	10 years availability with current trends	Gap in 2029 by norm 1	Gap in 2029 by norm 2	Additional seats per year to reach norm 1 by 2029	Additional seats per year to reach replacement level of norm 2 by 2029
1	Rajasthan	28,790	41,129	75,403	2,650	49,532	* (-8,403)	25,871	-	-
2	Odisha	17,209	25,185	46,172	1,350	27,268	* (-2,083)	18,904	-	-
3	North-East	17,851	27,463	50,349	1,276	27,041	422	23,308	42	-
4	MP	26,872	43,576	79,889	2,600	47,498	* (-3,921)	32,392	-	-
5	Bihar	37,476	62,460	1,14,509	1,350	43,481	18,979	71,029	1,898	2,201
6	UP	57,946	1,19,887	2,19,794	6,349	1,09,846	10,041	1,09,947	1,004	-
7	Chhattisgarh	2,810	15,327	28,100	1,100	13,248	2,079	14,852	208	-
8	Jharkhand	2,969	19,793	36,287	350	5,875	13,918	30,412	1,392	1,171

9. The above figures are all computed using data derived from professional council reports- what we termed study 1 approach. But since study 2 on availability of health professionals based on NSSO 68th round generates estimates which are significantly less than study 1 we repeated the availability, gaps and requirements assessment using these figures.

Table 1.3.4: Availability of qualified doctors as per NSSO 68th round (study 2) and projection for 2024

	Groups	State	Availability (2011)	Req:- Norm 1 (DN1)	Req- Norm 2 (DN2)	Current available seats (2018) CAS	availability in 5 yrs- current trends (D1)	Gap 2024 norm 1 (G1)	Gap 2024 norm 2 (G2)	#A' ASR 1	#B' ASR 3
1	Group 1	Maharashtra	97,766	67,425	1,23,612	7,270	1,24,339	* (-56,915)	* (-727)	-	-
2		Karnataka	31,770	36,657	67,205	8,845	72,818	* (-36,160)	* (-5,613)	-	-
3	Group 2	Goa	846	875	1,604	150	1,511	* (-636)	93	-	-
4		Delhi	12,591	10,073	18,467	1,100	16,832	* (-6,759)	1,635	-	-
5		Uttarakhand	6,859	6,052	11,095	800	10,173	* (-4,121)	922	-	-
6		Kerala	10,690	20,044	36,747	4,150	30,371	* (-10,327)	6,376	-	-
7		Andhra	19,454	50,748	93,039	8,500	60,008	* (-9,260)	33,031	-	-
8		Tamilnadu	11,544	43,288	79,362	6,850	44,639	* (-1,351)	34,723	-	-
9	Group 3	UP	1,23,884	1,19,887	2,19,794	6,349	1,43,240	* (23,353)	76,553	-	4,641

10		Tripura	1,359	2,204	4,041	200	2,223	* (-19)	1,818	-	2
11	Group 4	Haryana	8,366	15,211	27,887	1,450	14,779	431	13,107	86	-
12		Gujarat	8,462	36,264	66,484	3,830	26,765	9,498	39,718	1,900	-
13		Manipur	286	1,713	3,141	200	1,257	456	1,884	91	-
14		Himachal	69	4,119	7,551	650	3,312	807	4,239	161	-
15	Group 5	Chhattisgarh	9,196	15,327	28,100	1,100	13,777	1,550	14,323	310	305
16		West Bengal	31,947	54,766	1,00,404	2,700	42,252	12,514	58,152	2,503	2,320
17		J&K	2,884	7,525	13,795	500	5,096	2,429	8,699	486	190
18		Punjab	6,104	16,646	30,518	1,275	11,868	4,778	18,649	956	251
19		Meghalaya	623	1,780	3,264	50	811	969	2,453	194	113
20		Odisha	5,457	25,185	46,172	1,350	11,661	13,524	34,511	2,705	959
21		Jharkhand	2,309	19,793	36,287	350	3,828	15,965	32,459	3,193	1,464
22		Rajasthan	2,742	41,129	75,403	2,650	15,718	25,411	59,686	5,082	1,120
23		MP	2,179	43,576	79,889	2,600	14,961	28,615	64,929	5,723	1,394
24		Bihar	3,123	62,460	1,14,509	1,350	9,561	52,899	1,04,949	10,580	4,375
Total (Aggregate)		**India**	**4,11,691**	**7,26,513**	**13,31,940**	**65,769**	**6,81,801**	**20,946**	**6,06,568**	**4,189**	**149**
Actual gap and requirement		**India**						**1,69,847**	**6,12,908**	**33,969**	**17,135**

A': Additional seats required in year 1 to reach norm 1 by 2024,

B': Additional seats required in year 2 to reach optimal level (i.e. replacement levels taken as 5% of requirements by norm 2)

10. Comparing the two estimates we find that the overall gaps by norm 2 rise from 3.02 lakhs in the study 1 estimate to 6.12 lakhs in the second estimate. – but, the trends are very similar and the implications for additional seats are very much the same.
11. There is a persuasive argument that we put forth to state that the optimal additional seats required for medical studies is as low as 17,135 –and further these are required only within 11 states which are as follows: Uttar Pradesh 4641; Bihar 4375; West Bengal 2320, Jharkhand 1464, Madhya Pradesh 1394, Rajasthan 1120, Odisha 959, Chhattisgarh 305, Punjab 250, J&K 190 and Meghalaya 113. **The challenge is therefore not of absolute numbers as required at the all India aggregate- but its distribution across states.**
12. The excess generated in the southern and western states ***does not*** shift to the under-developed states. Both state policies and the nature of the labor market contribute to this.
13. The variability in generation and availability is also observed within states. Hence, similar exercise is to be done at district/cluster of districts level. A population unit of 2 million can be considered for planning the HR requirement. Where a district size is more than 2 million, or in the one to two million range, then the district is the unit of HR planning. Where the district size is smaller, a number of districts can be taken together as a cluster for the purpose of HR planning. Such a cluster could be an entire region of a state- where districts

are similar in level of development and there is a socio-cultural affinity between the districts so combined.

14. In many states, despite availability of adequate numbers in the labor market within these states, the governments fail to recruit enough the human resources they need – especially in rural and remote areas, and in urban municipalities. One of the main reasons for this is the failure to sanction adequate posts. The second common reason is inappropriate workforce policies. This includes unhelpful, sometimes absurd rules along with different degrees of recruitment and deployment inefficiencies. If these were taken care of, then there would be adequate workers available for recruitment in the labor market– except in the case of specialists. The issue of specialists is discussed in another section below.
15. In all states there has to be careful consideration of where the new seats have to be created, and even whether there has to be re-distribution across medical colleges. Ideally it would be adequate to reserve seats in the metropolitan medical colleges, which have large number of seats, for those coming from under-serviced areas. But in view of the policy of reservations and NEET this is difficult to negotiate. But shifting seats to under-serviced areas is uncharted terrain- and may be equally difficult to achieve. What should however motivate such a move is the clear understanding from a wide number of international and national studies, that preference to local candidates from under-services areas is one of the most effective ways of attracting and retaining health professionals in underserviced areas. (World Health Organization, 2010). Therefore in most states and UTs a cap on further medical colleges and nursing schools should be accompanied by measures to a) an increasing quality and content of education b) preferential admissions for students from under-serviced areas c) innovative methods of recruitment and deployment and support to get the appropriate persons to work in the areas that are currently HR deficient.
16. One of the major questions that the sub-groups considered at some length was whether the burden of creation of all these additional seats and of making these skilled health workers in the human resource deficit areas is entirely that of the government. Or are there ways in which markets can be encouraged so that private sector helps close the gap? The conclusion was that left to markets, this would not happen, since return on investments is always likely to be better in affluent urban markets. Therefore public financing would have to be applied. Public financing can be used for purchasing care or technical education from private providers or for direct provision by government institutions. The choice should be guided by availability, feasibility and cost considerations. Since despite many efforts in this direction, there is no clear successful strategy by which the private sector can achieve this, the burden of this commitment would have to be shouldered by much better quality of public health management than we have seen hitherto. But the space must be created and left open for potential not for profit private providers and networks led by individuals motivated for reaching out to the poor and more vulnerable.

A. II. Nurses- Including Graduate nurses, diploma holders, auxiliary nurses and midwives:

1. The current availability of nursing staff, and their estimated requirements and the current rate of generations can be estimated from either the professional council data (study 1 approach) or the NSSO data (study 2 approach). Table 1.3.5 below presents the data from study 1 approach and uses it to estimate the number of additional seats required. In case of nurses and midwives too, state policies would change as per the group. It is important to note that, the requirement is calculated for ANM, GNM and BSc nurses together. Decision for change in the seats would need further analysis.

Table 1.3.5: Availability of nurses and midwives as per professional council's data (study 1) and projection for 2024

	Group	State	Availability (2011)	Requirement- Norm 1 N1	Requirement- Norm 2 N2	Current generation (ANM+GNM+ BSc) (2019) (CAS)	5 years availability with current trends	Gap in 2024 by norm 1 G1	Gap in 2024 by norm 2 G2	# C ASR 1	# D ASR 3
1	Group 1	Kerala	1,15,585	56,790	1,10,240	10,940	1,58,726	*(-1,01,936)	* (-48,486)	-	-
2		Tamilnadu[b]	2,52,308	1,26,526	2,45,609	25,795	3,56,052	* (-2,29,526)	* (-1,10,443)	-	-
3		Karnataka	1,88,784	1,03,862	2,01,614	35,629	3,48,051	* (-2,44,189)	* (-1,46,437)	-	-
4		Andhra Pradesh[c]	2,52,897	1,43,787	2,79,117	16,080	3,08,007	* (-1,64,220)	* (-28,890)	-	-
5		Himachal Pradesh	19,084	11,670	22,653	2,640	30,375	* (-18,705)	* (-7,722)	-	-
6		Odisha	1,14,590	71,356	1,38,515	8,350	1,44,881	* (-73,524)	* (-6,366)	-	-
7		Punjab[a]	67,965	48,958	95,036	20,568	1,64,009	* (-1,21,351)	* (-68,973)	-	-
8	Group 2	Gujarat	1,28,132	1,02,747	1,99,451	13,590	1,83,269	* (-80,521)	16,182	-	-
9		MP	1,28,549	1,23,466	2,39,668	23,560	2,33,495	* (-1,10,029)	6,174	-	-
10		Haryana	32,703	43,097	83,660	7,745	68,158	* (-25,061)	15,502	-	-
11		Maharashtra	1,29,230	1,91,036	3,70,835	19,155	2,12,082	* (-21,046)	1,58,753	-	-
12		Rajasthan	61,694	1,16,532	2,26,210	16,650	1,38,774	* (-22,242)	87,436	-	-
13		North East[d]	40,280	77,813	1,51,048	16,009	1,16,297	* (-38,484)	34,752	-	-
14	Group 3	Delhi	30,386	28,539	55,400	1,764	36,168	* (-7,628)	19,233	-	1,006
15	Group 4	Chhattisgarh	6,131	43,427	84,299	7,565	43,343	84	40,956	17	-
16		Uttarakhand	807	17,147	33,285	2,880	15,126	2,020	18,159	404	-
17	Group 5	West Bengal	1,06,793	1,55,169	3,01,211	5,280	1,22,514	32,656	1,78,697	6,531	9,781
18		UP	49,953	3,39,681	6,59,381	21,900	1,54,458	1,85,223	5,04,923	37,045	11,069
19		Jharkhand	5,608	56,080	1,08,861	3,315	21,622	34,458	87,239	6,892	2,128
20		Bihar	16,656	1,76,969	3,43,528	4,451	37,245	1,39,724	3,06,283	27,945	12,725
Total (Aggregate)		**India**	**17,43,631**	**20,58,453**	**39,95,821**	**2,63,866**	**28,92,651**	***(-8,64,297)**	**10,56,971**	**-**	**-**
Actual gap and requirement		**India**						**3,94,165**	**14,74,287**	**78,833**	**36,709**

*- excess,

C: Additional Seats Required in year 1 to reach norm 1 by 2024,

D: Additional Seats Required in year 2 to reach optimal level (i.e. replacement levels taken as 5% of requirements by norm 2).

a: includes Chandigarh b: includes UTs-Puducherry, c: includes Telangana d: includes all north-east states **Goa and Jammu & Kashmir- data not available for current availability of nurses and midwives

2. The implications of the above table could be listed as follows:
    a. There is no need to emphasize expansion of nursing colleges for states in group 1 and 2, as these have achieved norm 1 and norm 2 requirement. The focus in these states should be re-distribution within. There is also no need to insist on capping- because excess nursing does not lead to same problems of unnecessary and irrational care that over-crowding and competition among doctors and specialists causes. At best the labour market is saturated.
    b. For Delhi, which is category 3, an increase in the seats would be required to meet norm 2 requirements. With an increase in the seats by 1006, norm 2 would be achieved in 12 years, instead of 16 years with current rate of generation. For Chhattisgarh and Uttarakhand (category 4 states) even at current rate of generation the required numbers for meeting norm 1 would be met by 2025 and 2026 respectively and they would achieve norm 2 in another four years (see table 1.3.6). The focus can therefore be on quality improvements.
    c. For states in group 5, the gap is large and considerable investments are required even with the target of 2029 for norm 1. These states need to increase the seat numbers incrementally over the years. The projection for this is given in table 1.3.7.

Table 1.3.6: Year of meeting requirements by norm 1 and 2 in category 2, 3, and 4 states.

Year by which the norm can be achieved	Norm 1	Norm 2
2025	Chhattisgarh	Gujarat, MP
2026	Uttarakhand	Haryana, NE states
2029		Rajasthan, Chhattisgarh
2030		Uttarakhand
2032		Maharashtra

Table 1.3.7: Availability of nurses and midwives as per professional council's data and projection for 2029 in category 5 states

State	Current Availability	Requirement- Norm 1	Requirement- Norm 2	Current generation	10 years availability with current trends	Gap in 2029 by norm 1	Gap in 2029 by norm 2	Additional seats in year 1 to reach norm 1 by 2029	Additional seats in year 1 to reach replacement level of norm 2 by 2029
West Bengal	1,06,793	1,55,169	3,01,211	5,280	1,38,234	16,935	1,62,977	1,693	9,781
Uttar Pradesh	49,953	3,39,681	6,59,381	21,900	2,58,962	80,719	4,00,418	8,072	11,069
Jharkhand	5,608	56,080	1,08,861	3,315	37,636	18,443	71,224	1,844	2,128
Bihar	16,656	1,76,969	3,43,528	4,451	57,835	1,19,134	2,85,693	11,913	12,725

3. If instead of using data from the registers the estimates derived from NSSO 68th round (study 2) are used we get a different set of numbers. This is presented in table 1.3.8.

Table 1.3.8: Availability of qualified nurses and midwives as per NSSO 68th round (study 2) and projection for 2024

	Groups	States	Availability (2011)	Requirement- Norm 1 N1	Requirement- Norm 2 N2	Current generation (2019) (CAS)	5 years availability with current trends	Gap in 2024 by norm 1 G1	Gap in 2024 by norm 2 G2	# C' ASR 1	# D' ASR 3
1	Group 1	Kerala	61,801	56,790	1,10,240	10,940	1,10,321	* (-53,531)	*	-	-
2		Punjab	18,865	47,164	91,553	20,568	1,19,819	* (-72,655)	*	-	-
3	Group 2	Gujarat	79,176	1,02,747	1,99,451	13,590	1,39,208	* (-36,461)	60,243	-	-
4		Tamilnadu	45,453	1,22,650	2,38,085	18,335	1,32,582	* (-9,932)	1,05,503	-	-
5		Haryana	12,929	43,097	83,660	7,745	50,361	* (-7,264)	33,299	-	-
6		Uttarakhand	4,741	17,147	33,285	2,880	18,667	* (-1,520)	14,618	-	-
7		Sikkim	275	1,038	2,015	240	1,447	* (-409)	568	-	-
8		MP	12,347	1,23,466	2,39,668	23,560	1,28,912	* (-5,446)	1,10,757	-	-
9		Karnataka	7,942	1,03,862	2,01,614	35,629	1,85,293	* (-81,431)	16,321	-	-
10		Himachal Pradesh	755	11,670	22,653	2,640	13,880	* (-2,210)	8,774	-	-
11	Group 3	Mizoram	1,163	1,865	3,621	335	2,722	* (-856)	899	-	-
12		Manipur	1,199	4,855	9,424	940	5,779	* (-925)	3,645	-	-
13	Group 4	Maharashtra	47,197	1,91,036	3,70,835	19,155	1,38,252	52,784	2,32,583	10,557	-
14		Rajasthan	17,823	1,16,532	2,26,210	16,650	99,290	17,242	1,26,920	3,448	-
15		Arunachal	332	2,352	4,566	410	2,349	3	2,217	1	-
16		Chhattisgarh	5,875	43,427	84,299	7,565	43,113	314	41,186	63	-
17		Andhra Pradesh	16,070	1,43,787	2,79,117	24,647	1,37,698	6,089	1,41,418	1,218	-
18		Odisha	4,197	71,356	1,38,515	8,350	45,528	25,828	92,987	5,166	-
19		Goa	102	2,480	4,813	250	1,342	1,138	3,471	228	-
20	Group 5	A and N	449	647	1,256	40	604	43	652	9	23
21		Meghalaya	801	5,044	9,791	410	2,771	2,273	7,020	455	80
22		Assam	6,241	53,049	1,02,978	3,757	24,402	28,647	78,576	5,729	1,392
23		J&K	2,257	21,320	41,386	1,695	10,507	10,814	30,880	2,163	374
24		Jharkhand	5,278	56,080	1,08,861	3,315	21,325	34,755	87,536	6,951	2,128
25		Delhi	2,350	28,539	55,400	1,764	10,935	17,604	44,465	3,521	1,006
26		Nagaland	257	3,363	6,529	230	1,381	1,982	5,148	396	96
27		West Bengal	7,302	1,55,169	3,01,211	5,280	32,972	1,22,198	2,68,239	24,440	9,781
28		Uttar Pradesh	9,991	3,39,681	6,59,381	21,900	1,18,492	2,21,189	5,40,889	44,238	11,069
29		Bihar	4,164	1,76,969	3,43,528	4,451	26,003	1,50,966	3,17,526	30,193	12,725
30		Tripura	110	6,246	12,124	585	3,024	3,221	9,100	644	21
Total (Aggregate)		India	3,77,445	20,53,430	39,86,070	2,57,856	16,28,980	4,24,450	23,57,090	84,890	-
Actual gap and requirement		**India**						**6,97,091**	**23,85,437**	**1,39,418**	**38,695**

* - excess , Lakshadweep- data not available, # C' : ASR1: Additional seats required in year 1 to reach norm 1 by 2024, # D': ASR 3: Additional seats required in year 2 to reach optimal level (i.e. replacement levels taken as 5% of requirements by norm 2).

4. The interpretation of this data is similar to what was done with table 1.3.5. However the numbers are now much more. Whereas in table 1.3.5 the deficit in year 2024 (given

current rate number of seats) by norm 2 was14.74 lakh nursing staff, by table 3.8, it rises to 23.85 lakh. The total seats required once the short-fall is closed and the system stabilizes at its full requirement of 39.86 lakhs is only 1.99 lakhs (close to 2 lakhs). In India as a whole the total number of seats is already 2.57 lakhs. However if instead of averaging in India as a whole, we add the required number of seats to reach the replacement level in each state which has a deficit in number of seats we need another 36,709 seats spread over the main EAG states with 87% of the deficit coming from just three states- Bihar (12,725); Uttar Pradesh (11,069) and West Bengal (9,781).

5. However since current short-falls in the nurse deficit states are so high to reach even norm 1 by 2024, that there is a case for a much higher increment of short-term nursing courses of the ANM and GNM variety. The additional number of seats could be anywhere from 78,833 (study 1 approach) to 1,39,418 (study 2 approach) and would have to be spread across 16 states. We note that Maharashtra does relatively well in number of doctors, but has a huge gap in nurses.
6. This report notes the very high degrees of unqualified nurses who are at work, largely in the private sector. Clearly the labor market is making up the gap using unqualified nurses. Meanwhile central government policy heads in the other direction and responding to the surplus nurses in the leading states has mandated the conversion of all GNM courses into B.Sc nursing courses. Government policy needs to factor in measures to address not only the better distribution of nurses, but measures required to restrict the use of unqualified nurses, even where qualified nurses are available, and measures to ensure that women in each under-serviced cluster are able to secure entrance to nursing education and secure regular employment within these same clusters.
7. Another important measure to close the gap of 23.85 lakh nurses that would be our deficit against requirements is to add in the cadre of 10 lakh, or even 15 lakh ASHAs- as a para nurse that would help us close the gap. A process of formal certification of ASHAs is well under-way and if this can be scaled up, this may be the only way available to close this huge gap. Eventually the ASHA would become a cadre of community health nurses- by upgrading those who are willing and able to qualify and by replacing those leaving the workforce by community health nurses.

Limitations of the approach:

Study 1 has used data from 2009, while study 2 has used 2011-12 data. Thus, the availability is estimated using 2011 population. Generation capacity of 2017-18 (for doctors) and 2019 (for nurses) is applied to this availability figure to estimate the availability from 2019-2024. There is underlying assumption that the availability has remained the same from 2011-12 to 2018-19. Thus, the requirement would be an overestimate, as availability has increased over the years. For differences in the state populations, it can be stated that, in states with more population growth rate (EAG states), the increase in availability and generation capacity has remained on lower side compared to other states. Therefore, the skewness would be more between states, if population estimates for 2019 were to be used. Nevertheless, the density of seats per lakh population has not changed widely in this period and thus, these estimates of requirement can be used for projecting resource requirements.

A III: Associate and Other Health Professionals

1. One of the challenges of making policy in this area is the wide diversity of work descriptions and cadre that constitute this category. These would range from management personnel to pharmacists at one end to community health workers and other frontline workers at the other. There is no definite norm for density of these professionals. As per Indian Public Health Standards, in a district of about two million population if all the facilities and hospitals were present according to norms, the ratio of Doctors: Nurses: Other and Associate Health Professionals would be 844 doctors, 2175 nurses, and 3526 associate/allied healthcare professionals which is a ratio of doctor: nurse: associate as 1: 3: 4. (Details in sub section B). This ratio calculation includes ASHAs as part of the Associate Professionals group (Annexure I). If ASHAs are not considered in this figure, the ratio would be 1:3:2. Thus, one rule of thumb that we derive from the Indian Public Health Standards is that excluding community health workers (ASHAs) there is approximately a need for 2 associate and other health professional for every doctor or for every 3 nursing staff. Thus is there are 44.5 doctors, nurses and midwives per 10,000 population there would be 22 associate/allied health worker per 10,000 population.
2. Currently, approximately 22.7 lakh associate and other health professionals are available, which translates to 17 associate and other health professionals per 10,000 population. There is still requirement of around 8.5 lakh professionals using this norm.
3. Moreover, there is felt requirement of more associate professionals, given the burden of mental health, cancers, disability-related issues, trauma and injuries, vision-related issues and cardiovascular disease, not only in the diagnostic or curative realms but from a primary and preventive care approach as well. If the gap is calculated assuming the optimal ratio of Doctors: Nurses: Other and Associate Health Professionals (excluding ASHAs) as 1:3:3, then there is need of 23,68,253 associate professionals, as per the following table 1.3.9.

Table 1.3.9: Requirement and shortage of associate and other health professionals at current supply.

	Demand in 2019 on projected population	Shortage @22 Lac Supply in 2019
Norm 1 (22 per 10,000)	30,45,502	8,45,502
Norm 2 (33 per 10,000)	45,68,253	23,68,253

Availability and Requirement of Other and Associate Health Professionals across states in 2019 is difficult to estimate due to lack of reliable data sources.

4. The majority of this workforce is such that it can be created at the level of each 2 million population unit- drawing from local youth looking for employment. It would be therefore possible to measure the gaps in each cluster of districts and close the gaps in that area. While training and certification would have to be rigorous, rules for entry into the educational/training institutions have to be appropriate and flexible.

Sub-section B: Resources Requirement for Human Resources for Health

1. Resource requirements vary between public and private sector. Here we are considering only those requirements that call for public health expenditure. These requirements could be broadly divided into two categories- resources required for paying salaries or remuneration to staff employed in the public health systems and resources required for generating the necessary human resources required (medical, nursing colleges and technical education).
2. The resource envelope that is potentially available as by 2024 as specified in the National Health Policy is 2.5% of the GDP, of which two-thirds is meant for primary healthcare. For the purposes of this computation we take primary healthcare to mean the entire capital and operational costs of district health systems (which includes all of primary and secondary care and some part of tertiary care). The costs of medical education and the infrastructure costs of tertiary care come from within the remaining one-thirds of this resource envelope. Across most health care systems, of the costs of primary healthcare approximately 60% or more go to human resources. At current economic size, the Indian GDP is estimated to be 220 lakh crores (2019-20). If nominal GDP grows by 12% a year (assuming 6-8% growth in real terms and 4-6% inflation), by 2024-25 the size of GDP would be approximately 375 lakh crores) and 2.5% of this would be 9.4 lakh crores in 2024-25. If two-thirds of this go to primary care the resource envelope is in the range of 6.2 lakh crores and 60% of this would be Rs. 3.7 lakh crore. This is one estimate of minimum public financial resources required for human resources for health in primary and secondary care sector- irrespective of whether it is purchased or provided by the government
3. Instead of top-down costing of human resources requirement based on policy commitment we could do a bottom- up approach to costing the HR required. For this purpose we can take the Indian Public Health Standards (IPHS) as a starting point. We also take the first 2007 version of the standards for peripheral healthcare requirements as they are more consistent with the health and wellness centers and the needs for comprehensive healthcare instead of the earlier very selective approaches.
4. As per the IPHS in a district with normative population of 2 million, there would be 400 Sub-health-centers, now upgraded to health and wellness center, 66 Primary health centers (PHCs), 16 Community Health centers and 1 district hospital. We are assuming 50 beds for each CHC, instead of the 30 bed norm to ensure that we account for taluk hospitals and other sub-district hospitals. We are also assuming a 500 bed district hospital. Further we are costing the HR of an additional 200 beds of tertiary care-specialty services. The salary of the health professionals is considered as an average across states.

Table 1.3.10: Human Resources in public sector as per IPHS for a population unit of 2 million

	SHC-HWC	PHC	CHC	DH	Total HR	Monthly remuneration
ASHAs	2000	-	-	-	2000	8,000
Specialists/Doctors/ MLHPs	400	198	128	118	844	70,000
Nurses and midwives	1200	330	320	325	2175	30,000
Dentists	-		16	3	19	40,000
Pharmacists, technicians and other paramedical professionals	-	429	592	269	1290	20,000
PHC support staff- LHV and male health assistant	-	132	-	-	132	30,000
Hospital secretarial and support staff	-	-	64	24	88	30,000
Total					**6545**	

5. Based on the above table the expenditure on human resources works out to around Rs. 17.3 Cr per month. *An additional 10% overheads cost is included for training and program management.* Thus, total 19 Crores would be required in a district per month for HR component. Annual requirement for a district of 2 million population would be Rs . 228 Cr. Extrapolating to the nation, and costing for 600 such units- the public health expenditure of remuneration would work out to Rs. 1.37 lakh crores per year currently- Even if we assume that cost of human resources rise by 5% per annum, the expenditure on remuneration would be around 1.75 lakh crores, which is approximately less than half of the resource envelope estimated earlier. The point that is being made is that the human resources proposed by the 2007 IPHS norms is realistic and well within the policy commitments that have been made.
6. At the WHO norm of 44.5 per 10000 health professionals and another 17 per 10,000 associate professionals we would expect a district of 2 million persons to have 12,300 human resources for health. Our costing is only for 6545 human resources for a 2 million population- about half the required numbers and this too we arrive at only after counting every ASHA as a nurse. When it comes to doctors the WHO norms calls for 2200 doctors per 2 million population whereas the IPHS derived norm we use provides for only 844 doctors. With regards to nursing cadre the WHO norms recommends 6600 staff, whereas the IPHS provides for only 2175 which rises to 4175 if every ASHA were to be considered against this head. The point is again that the calculations are not too liberal or generous and does not exclude the space for a well regulated private financed based on individual fee-for-services or private insurance to exist along-side publicly

financed facilities. If the resource envelope was larger we could plan for a higher proportion of healthcare being publicly financed.

7. We also emphasize that we are mentioning the costs of HR that is publicly financed- and not all of them have to be public providers. It could be a part of a public private partnership. This is a question we discuss in a subsequent section on the appropriate strategy to effect distribution. The importance in expressing the expenditure that would go into deployment of human resources is to highlight that planning for HR is not only planning for generating more human resources, with an understanding that market forces will distribute them to areas of need. Market forces do not do so, and public financing is a must for achieving a distribution that meets the needs of universal health care and health equity.
8. The other important question is the financing of medical, nursing and technical education. Unless public financing is directed towards states with larger deficits and within this at clusters/districts with greater deficit, the skew in distribution of human resources would not be resolved. When it comes to deployment, the Indian Public Health Standards and the differential norms it makes for tribal and hilly areas ensures equity in resource allocation. But no such policy exists for medical, nursing and technical education and training. Yet as studies have repeatedly shown us, the most effective way of ensuring distribution is preferential entry into training opportunities for youth from under-serviced districts, training in a place close to these same localities and then preferential appointment to the same region. (WHO, 2010).There would be migration of youth from such areas to more affluent urban areas, states and even nations, but there is very little reverse migration from affluent areas to poor localities. This calls for public investment in medical, nursing and technical education in such areas and substantial subsidies for such students tied with obligations to go back and serve these communities.
9. Based on estimates from a state, the level of public investment required is approximately estimated at Rs. 5 lakhs per year per medical student, Rs. 3 lakhs per year per nursing student and Rs. One lakh per year for the technical students. The exact additional amounts needed per state would depend on the seats that need to be created and this needs to be computed for each state. We note that some states have already created the necessary infrastructure and financing for the HR they require. Others are far behind.
10. One central question is the distribution between center and states with respect to the expenditure on healthcare and with respect to the investments needed for human resources generation. It is not clear whether transfers through finance commissions have gone to the health sector, and within the health sector whether the priorities for allocation are consistent with the needs for human resources generation and deployment. Centrally sponsored schemes did effectively transfer resources for human resources deployment – but to a very small sub-set- one ANM and a few program managers and staff of national disease control programs. Larger district level financing requires a different approach.
11. One example to learn from in public financing is the example of Thailand. The UC scheme of Thailand estimates the resource envelope needed for each district based on a

capitation fee for the population served and the previous year's case load of in-patient care and some categories of outpatient care. From this resource envelope a certain part is earmarked for salaries and this is paid through the department of health. The rest is sent to the district in two or three installments. Thus there is a clear association between resource allocation to districts and work outputs- though this does not conform to any traditional understanding of performance based or results based financing. It is just a responsive needs based financing of healthcare (World health Organization, 2015). This is important to learn for India, where the rigidities of line-item based budgetary financing fail to provide resources as per the needs and the caseloads seen. In Thailand the whole financing is central, but in India where much of healthcare is a state function, there can be a formula for sharing between state and center.

12. It is important to note that Thailand does have monetary incentives for teams, but almost no individual performance based incentives. This is the pattern shown in most reviews. Fee for services and individuals incentivized by performance based incentives work partly or not at all in ensuring quality of care. Monetary incentives have a limited role- but mostly for incentivizing teams and as compensation for hardships, difficult area postings and such.

Sub-section C: Addressing/Effecting Distribution

1. How do we ensure that the HR generated by existing capacity plus additional seats go to filling the gaps in under-serviced areas? The past experience is that if we leave it market forces, they would continue to crowd into a segment of the urban population- and the rest would remain without coverage. In a geographical area/region where provider density is high there would be a high level of competition. Competition and choice increases quality and reduces costs for a wide variety of consumer goods and services. But in, the health sector due to high degrees of information asymmetry, it leads to increase in unfair practices, and unnecessary healthcare.
2. There is a wealth of international and national experience and policy recommendations on the basis of which we can consider our options to improve the distribution of human resources in favor of currently under-serviced areas. These are listed below.

a. First and most important it helps to have more and more persons from that locality/region get access to professional training.
b. The second option that links with the first is to expand capacity of public services in under-serviced districts by creating more HR positions that would go to reducing the measured gaps in HR.
c. Public sector does face problems in filling vacancies in rural and remote areas, but if locality is a criterion for entry into professional education and for recruitment to serve in such districts, the outcomes are much better.
d. There is also considerable experience with efforts to promote private sector presence in the under-serviced areas. These are listed below:
    i. Publicly funded health insurance: One expectation was that if demand side financial support is available, private hospitals could expand or be set up in hitherto under-serviced areas. There is however little evidence of that

happening- and this is so even where such support has been functional for more than ten years. The barriers that make it difficult for public sector to find human resources, especially doctors for working in rural areas, also impact on the private sector.

ii. Contracting out District Hospitals, CHCs or PHCs to private sector: Again the experience is that no state has been able to achieve even 5% of such outsourcing, despite several efforts over the last two decades. This was an important feature even of the NHM, and many states did make serious efforts in this direction, but none sustained. This was also a feature of sector investment programs and earlier health sector reform initiatives. Most private providers prefer to opt for urban or near-urban facilities. When it comes to remote and rural areas, the usual barriers that impede public sector performance also impede private sector performance. However it is important to note that where a dedicated NGO or even a motivated individual were available and entered into a contract, it was possible to sustain a partnership. These are niche situations, and while it is important to emphasize the need for governments to have flexibility to allow such partnerships, they do not constitute a solution on scale.

iii. Contracting private GPs to run health centers: In Punjab this was tried in both rural and urban areas. More often this is tried only in urban areas, where availability of private providers is plentiful. The experience is that these are difficult to sustain. Firstly geographic dispersion is difficult to obtain, and contractees are hard to find where the need for them is more, and easier to find, where public sector alternatives exist. Secondly the governance barriers to making and managing multiple individual contracts and payment mechanisms are also challenging. And the third major limitation was that at best one was outsourcing a dispensary function. It seldom extended to a population based primary healthcare system. This is also the experience with Mohalla clinics

iv. Training and Support to informal healthcare providers: (increasingly the use of tele-medicine to provide such support.) This has been reported from Chhattisgarh, Bihar, UP, Andhra Pradesh and West Bengal. Many of these start up with considerable expectations but have not sustained. While governance challenges could be contributing, the simple fact from all these experiments is that the provider behavior of informal healthcare providers does not change with such training and support- and they do little for health outcomes.

v. Contracting out geographic areas to a large private sector entity and asking them to establish a network of such centers. The network is then expected bring in and managing the doctors and nurses that the network requires. This has been repeatedly tried in urban areas beginning with efforts under sector investment programs in the 1998 to 2004 period. The most recent in the outsourcing of urban primary health centers to Apollo Enterprises in Andhra Pradesh. Unlike with contracting individual GPs, the governance challenges are less. But given the nature of contracts, once again it is only the dispensary function that gets outsourced- not a comprehensive primary healthcare function. While the performance of such contracts is an open question, this has at least as yet little to

offer for the present question of addressing the mal-distribution of human resources for health.

e. For all these above reasons, the most feasible and desirable policy approach to addressing the poor distribution of human resources for health is to expand the public service delivery in all such areas. The problems of public service delivery are well-known but the problems with private sector alternatives are even more and as yet there is no way by which it addresses the problem of mal-distribution- which in our understanding is the central problem of human resources for health.
f. There are two corollaries of reliance on public provisioning to address mal-distribution of services and personnel. One is with reference to medical and technical education policies and the other is with reference to reforms in both workforce policies and financing mechanisms.
g. Medical education must be affordable to candidates coming from under-privileged backgrounds of under-serviced areas. This could either mean that expansion of seats has to be in public sector colleges and/or those students from such areas and backgrounds should have financial support linked to commitments to graduate and then serve in such areas. The curriculum design should also be appropriate to these healthcare needs.
h. While this is a challenge for medical education and even more so for post-graduation, for all other nursing, and associate/allied healthcare workers it should be possible to arrange for education, recruitment and deployment within the cluster or region of that state. This is not to be interpreted as reserving seats for locals- but rather building capacity in the local- where the non-local are unwilling to go and serve.
i. The reforms that are required in workforce policies to supplement the reform of medical and technical education, relate to better recruitment efficiency, and better retention through a combination of incentives and positive practice environment. But as compared to policy thinking on market based reforms, very little policy thinking has gone into the administrative reforms and innovations that are needed for better public service delivery. For example an UPSC style recruitment is appropriate where there are tens of thousands of applicants for a few posts in government. But when repeated advertisements do not turn up adequate candidates- one needs to consider recruitment through campus interviews, or a HR agency which has skills in recruitment from across the nation- dropping criteria that restrict recruitment only to the state, 5 year short-term special contracts for specialists or even medical doctors to work in under-serviced areas and so on.

Sub-section D: Specialist gaps

1. Specialist gaps however require more than the above measures. There is considerable expansion of specialist education ongoing- but this would be inadequate to meet numbers. Also because of the difficulties in entry for those serving in isolated areas or coming from more modest backgrounds, the specialists being generated would not be available for service where they are needed most.
2. One way forward is an altogether different form of expansion of post-graduate education so as to serve both the challenge of adequate numbers and better distribution. An option

considered is accrediting a much larger number of hospitals and healthcare providers to offer DNB training. And for some specialties notably for family medicine (the equivalent of MD in General Practice in nations like UK and Nepal) do away with the entrance examinations altogether. Medical officers working for over three years in empanelled hospitals – both public and private – in districts with specialist gaps, should be automatically eligible for getting trained and sitting for the DNB examinations. The aim should be to develop this DNB in family medicine as a basic specialist- Such a specialist would after a three year training undertake much of the secondary care work- including surgery that is required in a CHC in the fields of medicine, surgery, pediatrics, obstetrics, anesthesia.

3. CMC Vellore had designed a very good "dual mode" course for a diploma in family medicine, on these lines and this was able to help considerably where it was attempted. The dual mode course runs mainly on a distance education platform but has partnerships with clinical providers locally for mentoring and intensive six week residential training programs. Though it was not a DNB accredited course, it was able to provide medical officers working at the CHC level with the necessary clinical skills for "resolving more and referring less." Any district hospital which has the required set of specialists needed for the course and an academic program built into it and a large number of not for profit hospitals- especially mission hospitals working in remote locations would be ideal to take on such DNB (or equivalent) in family medicine course. In fact given the situation in medical education, it would ideal for all medical officers to take this or a similar course as part of a universal continuing medical education programs and continuing nursing and other technical education programs. A large number of private hospitals providing secondary care in such regions could also be engaged through PPPs for participating as training and mentoring institutions.
4. A similar multi-skilling of medical officers (6 month courses) in other select specialties through short terms or dual mode courses. This could be considered for under-serviced areas with huge specialist gaps, prioritizing those medical officers who are committed to serving in such localities for such training. These recommendations are consistent with the National Health Policy- 2017.
5. We propose a fresh national survey to assess the total stock and distribution of specialists across the states and within states. Very broadly, the study will involve the following: (a) Get from state governments complete list of all specialists who are currently in services and those enrolled under pension scheme along with their age and place of residence; (b) Get from association of specialists (from state /regional level offices), number of members currently registered and their place of residence, where they are currently employed; (c) Get details of specialist doctors from associations of drugs manufactures, pharmaceutical outlets and other sources if any. Such a survey will help in having a robust assessment of specialists across districts and sub-districts level. We suggest a survey of this nature once every five years, which will help significantly in estimating HR requirement for health sector.

Part 2: Infrastructure

Section I: Categorization in Infrastructure

1. The National Health Policy 2017 lays out seven important shifts in policy with reference to organization of health services. One of these is a focused increase in investment in human resources and infrastructure to areas where the needs are most. In the first part of this report we have dealt with human resources. This part discusses the gaps and policy options with regard to infrastructure.
2. Several of the problems that make planning for HR challenging, also apply to infrastructure. A mere increase in numbers without addressing key questions of need-based distribution and efficiency of utilization will not suffice. A mix of normative and case-load based computation of infrastructure and human resources is required for the purposes of both rational allocation of resources and equity. Whereas deployment of human resources, is a daunting task in rural areas, in urban areas, infrastructure development could be an even bigger problem, due to lack of space where it is required.
3. For the purposes of our discussion, we could categorize infrastructure into (a) owned and managed by public sector, (b) owned by private sector but facilitated and utilized (or could be potentially utilized) by the public sector through contracting of services, and (c) owned by private sector operating under market conditions- with the state role limited to regulation or not even that. It is important to note that in many states, the rules under Clinical Establishments Act are setting down minimum requirements for infrastructure.
4. We begin first with the availability and need for investment in public health infrastructure.

Section II: Public Health Infrastructure - Existing and Required

1. The Indian government has spelt out the Indian Public Health Standards in 2007 and revised it once in 2012; and these are currently again in the process of revision. The standards cover both infrastructure and human resources. These have so far, been applied only to healthcare facilities in the public health facilities.
2. Table 2.2.1 shows the existing state of infrastructure in the country, based on the Rural Health Statistics Report, 2018, as well as the shortfall in comparison to norms. There are currently about 1,56,231 Sub-Health Centres (SHCs), 25,652 Primary Health Centres (PHCs), 6732 Community Health Centres (CHCs) and Sub-Divisional Hospitals (SDHs) (we have clubbed CHC/SDH) and 779 District Hospitals. While most of these facilities are in government buildings, about 20% of SHC, 6% PHC and 2% CHC/SDH are either in rented buildings or in Panchayat/other rent free facilities.
3. The Sub Health Centre (SHC) and Primary Health Centres (PHC) largely serve to provide ambulatory care. The Community Health Centres have between to 30 to 50 beds, Sub Divisional hospitals have from 30 to 150 beds and district hospitals with bed strength ranging from 100 to 750, and going by the population norm of 5000 for a SHC-HWC,

30,000 for a PHC-HWC, a CHC/SDH for a population of 1,20,000 and a DH for a population of 2 million, the shortfall increases substantially. Table 2.2.1 depicts the revised shortfall.

4. The current proposal is to upgrade every sub-health centre into a health and wellness centre- which differs in that the latter has better infrastructure and HR and provides comprehensive rather than very selective basket of primary care services.

Table 2.2.1: Requirement and shortfall in Public Health Infrastructure (RHS, 2018)

Type of Facility	Required based on Census 2011 population	Total Existing (RHS, 2018)	Shortfall as per population norms	% of shortfall as per population norms	Shortfall in existing building	% of shortfall in existing
HWC- SHC (One per 5000 population)	2,40,000	1,56,231	83,769	34.9	30,022	19.2
HWC- PHC (One per 30,000 population)	40,000	25,650	14,350	35.9	839	3.3
CHC (One per 1,20,000 population) + SD/ Divisional Hospital	10,000	6,732	3,268	32.7	18	0.3
District Hospital	600	779	-179	-29.8	0	0.0

In terms of beds in public hospitals the short fall is even more difficult to estimate. One estimate puts total beds at 0.5 to 0.9 beds per 1000 population as against a norm of 2 beds per 1000 population.

Section III: Estimating resource requirements for public health infrastructure

1. For efficient allocation of finances and assuring availability of human resources and fit for service delivery buildings, we recommend that (as we suggested for human resources) planning be undertaken for a population cluster of two million. This could either be a single large district or a cluster of small districts. Planning and operationalizing for this cluster of one or more districts of population adding up to about two million as if this was one unit, makes it more viable and feasible for purposes of human resources deployment and bed distribution, establishment of diagnostic facilities, (such as histopathology/cytology), and serving as a knowledge/training hub for in service training and monitoring. The population catered to by each facility is only normative, and every district will need to map existing facilities using the underlying principle of time to care.

2. In such a model district/cluster of districts of 2 million population, there should be about 400 SHC-HWC, 66 HWC-PHCs, 16 CHC/SDH (fifty bedded) and 500 beds at the DH level. In addition to partially factor in the needs of tertiary care we add 200 beds for speciality services. This comes to about 1500 beds or about 0.75 beds per 1000 population. We know from NSSO data that the current rate of hospitalization is 5% per year, which would mean 1 lakh hospitalizations. This is the minimum required in every cluster of 2 million population, which could be "publicly owned and publicly financed" beds or "privately owned and publicly financed" beds. At an Average Length of Stay, (ALOS) of 5 days this requires about 1.5 beds per 1000 population. This we note is less than the 2 beds per 1000 population recommended in NHP-2017. Thus, the remainder of 50% of hospitalizations could be catered to by the private sector operating within a market environment. As access to services increases, utilization would increase and in case these are not already existing in the private sector, further beds can be added in the public sector or under public financing.
3. For estimating the resources required for infrastructure we could assume the cost of construction a new SHC to be Rs. 12.5 lakhs, for a PHC, Rs. 1.25 crores, for a CHC about Rs. 12.5 crores and for a DH (upgradation only), Rs 25 crores. We have calculated the cost of maintenance of existing infrastructure at 5% of new building. New construction is proposed for facilities where there is a shortfall. The proposal is therefore to provide an infrastructure resource for a normative 2 million district/cluster. This is shown in Table 2.3.1 and comes to Rs. 1,53,075 crores. The costs of tertiary care infrastructure are not included.

Table 2.3.1: Costing of physical infrastructure in a population of two million

S.No.	Infrastructure	Population Coverage	Units Required	Units Existing	Units Shortfall	Unit Cost (in Rs. Crores)	Maintenance cost of existing facilities @5% of unit cost	New Construction Cost	Total Cost (in Rs. Crores)
1	HWC - Sub-Centre	5,000	400	260	140	0.125	16,250,000	175,000,000	19.12
2	HWC - PHC	40,000	50	32	18	1.25	20,000,000	225,000,000	24.5
3	CHC + SDH	1,00,000	20	7	13	12.50	43,750,000	1,625,000,000	166.87
4	District Hospitals - 500 bedded (Cost of Repair & Refurbishment)	10,00,000	1	1		25	250,000,000		25
	Cost (for 20,00,000 population) (in Rs. crores)								**235.5**
	Cost (for 1,30,00,00,000 population) (in Rs. Crores)								**1,53,075**

Table 2.3.1 A: Fund requirement over 5 years

S.No.	Infrastructure	Total Cost	Year 1 (@10% of total cost)	Year 2 (@20% of total cost)	Year 3 (@30% of total cost)	Year 4 (@20% of total cost)	Year 5 (@20% of total cost)
1	HWC - Sub-Centre	19.12	1.91	3.82	5.74	3.82	3.82
2	HWC - PHC	24.5	2.45	4.90	7.35	4.90	4.90
3	CHC + SDH	166.87	16.69	33.37	50.06	33.37	33.37
4	District Hospitals	25	2.50	5.00	7.50	5.00	5.00
Total Cost (in Rs. crores)		235.5	23.5	47.1	70.6	47.1	47.1
Total Cost for 1.3 billion population (in Rs. Crores)		**1,53,069**	**15,307**	**30,614**	**45,921**	**30,614**	**30,614**

4. For 600 districts this works out to Rs. 1,53,069 crores over a five year period. But this is neither to be disbursed annually nor conceptualized as a onetime investment. There will always be a need for some new infrastructure that would be required, and renovation of existing infrastructure. Here infrastructure refers to both civic works and to large equipment.
5. The proposal is that **a central infrastructure fund pool** be created with a clear allocation for each state and, if required, an advance amount as well. As and when infrastructure is created and verified, the funds to reimburse the costs of construction can be drawn down by the state and district from the central pool. The verification would include ensuring that the infrastructure location and design is based on scientific need assessment, and that the necessary human resources for the functionality of that infrastructure have been sanctioned and are in the process of recruitment. There should also be a clause that within two years, a set of minimum outputs required of such a new facility in terms of services delivered, for that particular geographical and social context should be available.
6. Such a process of financing would allow districts that make good progress on infrastructure creation to go ahead and while states and districts with slower progress would not block funds flow on the pipeline. It would also ensure that infrastructure utilization proceeds on par with creation of infrastructure, and there is no wastage of funds. The latter is essential because infrastructure development has many drivers and improved health services is only one amongst them. Such public financing takes into consideration that fund requirements of different districts would vary widely and a central pool rather than district wise uniform allocation would be more advantageous.
7. The needs of health care facilities in urban areas vary widely. Since urban infrastructure also caters to rural populations, up to Class 1C cities (that is a population of ten lakhs). Therefore, planning needs to be combined with the rural, using the norm of 2 million population and adapting it as per needs. Funds would be from central and state allocations, and the central/state pool could also mobilize additional resources from

tribal sub-plans, backward area development plans, locally operating extractive industries, and other such sources.

8. In Class 1 A and 1 B, known as the million plus cities, urban health infrastructure would need to be planned for. Here there is a need to get urban local bodies to take charge and to use various incentives to ensure that a modern approach to urban health planning benchmarked with the best internationally is put in place. No city should be declared a smart city, unless such a health plan and the infrastructure plan required for it is put in place. In the million plus cities urban bodies would need to contribute substantially to resource mobilization.

Table 2.3.2: Classification of cities[3]

Category	Population range
Class 1 A,	Over 50 lakhs
Class 1B	Ten to fifty lakhs
Class 1C	One to ten lakhs
Class 2	50,000 to One lakh
Class 3	20,000 to 50,000
Class 4	< 20,000

9. It is important to note that a few mega-public hospitals- defined as hospitals catering to over 5000 to 8000 persons per day, with over 1000 beds act like huge sinks into which flow a large part of the seriously-ill poor population in any state. This is closely linked to the lack of comprehensive primary healthcare in urban areas, as over 70% of the patients coming to these hospitals are really in need of primary healthcare (MOHFW, 2014) Urban local bodies often respond to very high case-loads of the mega hospital by increasing the number of beds in existing hospitals even further. However if beds increase beyond a certain threshold (say 1000 beds in our context), "dis-economies of scale" set in, because other systems are not able to keep pace (Barnum & Kutzin, 1993). It is better to construct a new hospital. Urban healthcare planning needs to reserve the mega-hospital for tertiary care and through backward linkages (rather than the notion of gate-keeping) systematically transfer the primary healthcare load from these hospitals to secondary care hospitals and primary health care centres. Even though the resource requirements for this have to be worked out for the one million plus cities, the overall resource estimates will accommodate this.

Section IV: Private Infrastructure

1. Data on private sector infrastructure in health is difficult to obtain. This report has used two sources. One is the 67th round of the NSSO survey and the other is a private study of 62 major cities of the country during 2012. The latter study covered all the million plus cities plus state capitals even if their population was less than a million. It is the million

[3] (Source: High Powered Expert Committee for estimating the investment requirements for urban infrastructure, 2011)

plus cities that has most of India's private health services. The study reveals that there were 14,121 hospitals and out of which around 13,413 hospitals fell under private sector contributing to almost 95 percent of the total hospital facilities in these cities. Among the different types of establishments, hospitals were in majority with the share of around 71 percent followed by the nursing homes with 24 percent. Trusts and charitable hospitals contributed to around 3 percent and corporate hospitals 1 percent. Corporate hospitals had an average of 177 beds, which is much higher than trust and charitable hospitals which is placed second with average of 68 beds followed by private hospitals with 35 beds and nursing homes with 17 beds. The corporate hospitals, even though contributed to merely one percent of total hospitals, was second in terms of number of doctors. There were 3413 doctors in corporate hospitals with average availability of 29 doctors per facility which was highest across the facility.

2. Of the above urban hospitals, 48 percent were located in just eight big cities that have population more than 5 million: Mumbai, Kolkata, Delhi, Chennai, Bangalore, Hyderabad, Pune and Ahmedabad. The distribution is most skewed in case of corporate hospitals as around 67 percent of them are located in the big cities. Mumbai had shown highest presence of health facilities among all the big cities. Mumbai alone has 2,119 facilities out of 13,413 private facilities across the cities contributing to around 16 percent of total health facilities.

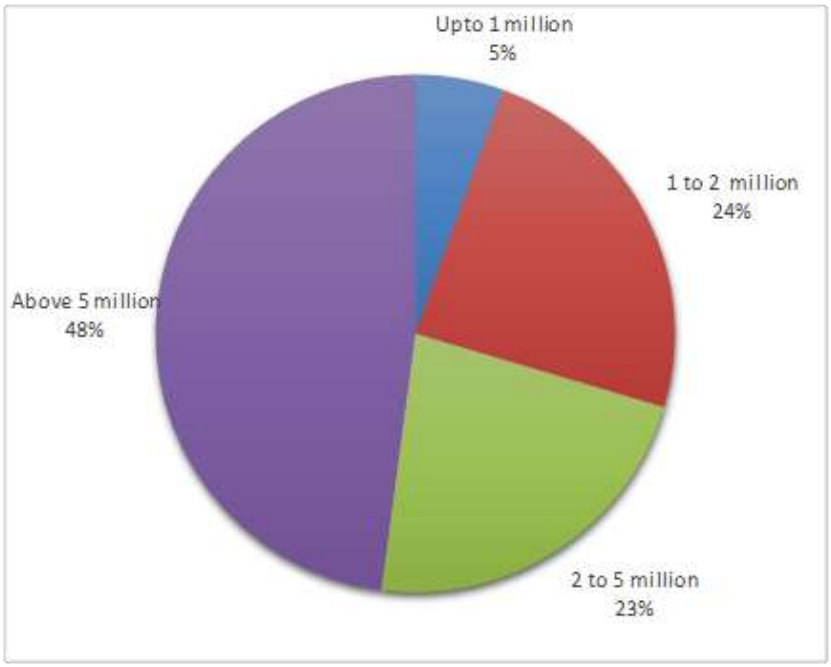

Figure 2.4: Location of private hospitals across 62 cities- population wise

3. There are huge inter-state inequalities in density of hospital beds and doctors in private sector. For instance states regions like Chandigarh (342), Delhi (258) and Kerala (139) has very high density of beds per lakh population in private sector. All the southern and western states have bed density of 50 or above. In contrast bed density in states like Odisha (18), Chhattisgarh (16), Bihar (13) and Assam (11) is much lower. Similar pattern could be seen in density of doctors employed in private sector. Chandigarh

(898), Delhi (252), Kerala (180) and Tamil Nadu (125) has more than 100 doctors in private institutions. Whereas Bihar (8), Rajasthan (10), Jharkhand (15) and Chhattisgarh (19) has less than employed in private institutions. This estimate however, do not include the doctors involved in individual private practice.

4. Thus we observe that private sector is present only in larger cities and states which are more developed. These same cities and states are also the ones with better presence of public sector infrastructure. Further the state level number gloss-over the issue of inter-district inequalities within states and private sector presence would be much more scarce in remote districts across country.
5. NSSO 67th round (2010-11) also provides details about own account enterprises (OAE) which can be equated with private practices of individual doctors and establishments providing health services in private sector. The following tables provide data about the private infrastructure based on this survey. These tables must however be read with caution- the main caution being that it counts unqualified and informal providers also giving rise to a high numbers in states known to have a weak development. The numbers related to establishments are more reliable, but here too the pattern in not consistent across states and this may be due to sampling issues. So, though this data is being presented, much caution is required in its interpretation. For this reason we have shown these two tables only in the annexures.

Section V: Recruiting Private Health Infrastructure for Public Services / Publicly Financed Services

1. The sub-group examined the possibilities of mobilizing health infrastructure for serving public health goals. The introduction of publicly funded insurance programs was expected to reduce the differences between public and private owned facilities, since the patient was expected to get free care in either facility and also have a choice on where to go. In practice this has not happened- at least not as yet. Most studies show that even the highest OOPE that the patient incurs in a government hospital is less than the lowest OOPE incurred with insurance in a private hospital. However, it is reported that a considerable part of private hospital infrastructure/beds that has been created lies idle, and has the potential for utilization. This "marginal capacity" of the private hospital therefore is open to recruitment- and it is likely that with better verification and payment mechanisms, better monitoring and regulation, this could be a useful approach to enhancing hospital/bed capacity. This marginal capacity cannot substitute for the required investment in public infrastructure indicated earlier, but it could be a useful supplement. Considerations of which route to take for expansion, should be based on which leads to lower costs (societal costs) per in-patient seen. This could also be used to negotiate prices based on marginal capacity, rather than on full recovery of the costs.
2. Another approach considered is to extend credit or fund transfers to private agencies to set up health infrastructure that would be used for public purposes. There are two approaches to this. One is an outright transfer of entire infrastructure costs- either by outsourcing a facility that already exists or paying the agency for building a new one. Despite many efforts at this approach, these have seldom succeeded. Also, if the private

partner is bringing in no investment, then the advantage of government transfers is not clear, nor does the private agency have the compulsion to maximize efficiency in the way they would need to, in order to recover their own investment.

3. Most public private partnerships around health infrastructure have the government paying for part of the investment and the private agency bringing in the rest with a contract specifying what the government gets in return. Partnerships with corporate hospitals built around providing land to them at nominal costs or around customs and tax exemptions have seldom been able to realize the benefits for public purposes. A more recent approach is for the private agency to establish a hospital using concessionary bank loans, typically from the International Finance Corporation or similar arrangement, and in addition, the government pays for a "viability gap" funding. In return, the private owner has to agree to be empanelled for the insurance scheme, but otherwise it can charge fees on the basis of its own perception of market rates. Experience in this approach is limited- but private capital seems reluctant to make such investments in the lower resourced states, even when offered urban or near-urban sites to locate such hospitals.
4. We however note that across the states there are a set of not-for-profit hospitals, (e.g. Mission Hospitals, Arvind Eye Hospitals, etc.), which have established a business model where running costs are recovered through user fees and some element of cross-subsidy for the poor is built in through differential pricing. The initial infrastructure and subsequent expansions, especially in faith based hospitals were based on donations and not on bank loans. The Mission Hospitals have a capacity of close to 60,000 beds across the country, almost the equivalent of all district hospitals- and some of them work in very remote areas. Some of these hospitals are participating in PMJAY and other Publicly Financed Health Insurance scheme but many stay out because they do not have the deep pockets required to manage delayed and incomplete payments. These models are now in crisis since there are no external donations coming in for fund renewal or expansion of infrastructure. These hospitals could receive one time grants for expansion of beds, equipment and services. The hospitals that would qualify for such grants would be private not for profit hospitals with (a) proven track record of cross-subsidy, (b) working in a cluster of districts where there is a over 50% deficit in beds and human resources (c) are already providing a range of secondary and tertiary care services and (d) whose existing capacity is fully utilized. Though these criteria seem excessively stringent- such grants could establish a range of comprehensive secondary and tertiary care services in very high service deficit areas.
5. However, for the main part, it does seem that the major investments for expanding infrastructure in HR and infrastructure deficit districts would depend on public investments in government owned and managed facilities.

In Summary:

The development of private health infrastructure is much skewed across states and within states. The development of public infrastructure is relatively more equitous within states, thanks to the Indian Public Health Standards, but some states have large gaps. As compared to requirements matched to the growing population there would be an about 35% short fall in primary care facilities (Sub-Health centers, PHCs and CHCs). In terms of hospital beds the available bed strength could range between 0.5 to 0.9 beds per 1000 population when the requirement would be at least 1.5 beds per 1000 population.

To close the gaps an investment of Rs. 150,000 crores over 5 years or Rs. 30,000 crores per year (or about 47 crores per 2 million population per year) would be required. These could be built and owned by government or could be purchased/contracted in capacity. The problem with the latter option is the lack of availability where the gaps are most. It is therefore recommended that planning for infrastructure be done for a cluster of one or more districts of about 2 million population so that additional investments in infrastructure go to where the gaps are most.

A flexible and efficient public financing arrangement could ensure that districts could draw down the necessary funds from a central/state level pool in annual installments based on their approved long term infrastructure plan- the next installment flowing down only when rate of expenditure, deployment of human resources and service delivery in these new facilities keeps to the agreed levels. In addition to central and state contributions, funds could be mobilized into this pool from tribal sub-plans, development plans for backwards districts, from extractive industries and other sources.

Annexures

Annexure 1: The Categorization of Human Resources for Health

(The ISCO codes are indicated in brackets below)

1. **Health Professionals**
    i. Medical Practitioners:
        a. Doctors-Generalists (2211)- refers only to MBBS doctors
        b. Doctors- Specialists (2212)- refers to diploma or degree after MBBS
    ii. Nurses:
        a. B.Sc and Higher (2221)(>3 years training)
        b. GNM(2221/2222) (3 yr training)- often referred to as staff nurses
        c. ANM (2221/2222)(1.5 yr training)- official designation in government is multi-purpose health workers.
        d. Professional Midwives (2222) (proposed – 4yr training) very few exist in this category
    iii. AYUSH Practitioners (2230)(4 years training) (footnote: in ISCO listed as alternative and complementary medical practitioners)
    iv. Mid-Level Healthcare Providers (2240)
        i. Nurse Practitioners (3+0.5 year training)
        ii. Physician Assistants (4 year training)
        iii. AYUSH practitioner (4+ 0.5 year training)
        iv. Rural Medical Assistant (3.5 year training)
    v. Other Health Professionals:
        a. Dentists (2261)
        b. Pharmacists (2262)
        c. Physiotherapists (2264)
        d. Dieticians and nutritionists (2265)
        e. Audiologists and speech therapists (2266)
        f. Optometrists and ophthalmic opticians (2267)
        g. Health professionals not elsewhere classified : occupational therapists (2269)

2. **Associate Health Professionals:**

    i. Medical imaging and therapeutic equipment technicians (3211)
    ii. Medical and pathology laboratory technicians(3212)
    iii. Medical and dental prosthetic technicians (3214)
    iv. Midwifery Associate Professionals (3222)
    v. Traditional and complementary medicine associate professionals (3230)
    vi. Dental assistants and therapists (3251)

vii. Medical records and health information technicians, data entry operators, clinical coders (3252)
viii. Physiotherapy technicians and assistants (3255)
ix. Medical Assistants (3256)
x. Social work and counseling professionals (2635): HIV counselor, Family planning counselor, NCD counselor, Adolescent Health Counselor, social work, de-addiction workers, health navigator, etc. (footnote: this is listed in health management and support personnel in ISCO)

In this emphasis on three categories of Associate Public Health professionals
xi. Multipurpose Health worker: (footnote: listed in ISCO as Environmental and occupational health inspectors and associates (3256) or not classified elsewhere)(3259). There is a case for including ANM here.
xii. Ambulance workers (3258)
xiii. Community Health Workers (3253): ASHAs, Sahiyyas, Mitanins etc.

3. **Personal Care workers in Health Services**: This includes Nursing aide, Patient care assistant, Birth assistant (hospital/clinic or home), Ward Boy, Phlebotomist: 5321, 5322: Characterized by no training or minimal training: (footnote : Listed as Health care assistant and home based personal care workers, or as personal care workers in ISCO).

4. Health Management and Support Personnel:

i. Health Service Managers and management personnel (1342): Would include all non-medical and medical administrators- from administrative positions at state/national level, to facility administrators and senior management, to cadre managers like nurse matron, public health managers, and those whose work is entirely supervision;
ii. Life science professionals (2131,2133): Would include : Entomologist, Epidemiologist, Bacteriologist, Biotechnologist, Microbiologist, Molecular biologist, Molecular geneticist, Pharmacologist, Water quality analyst; Bio Medical Engineers, Environmental engineer, Health economist, Health policy analyst, bio-statistician
iii. Medical secretaries: 3344 (All clerical and accounting staff at different skill levels and functionals)
iv. Non-health technicians and support staff not elsewhere classified: Would include those involved in sales, maintenances, mechanics, elementary occupations-sanitation, security, kitchen)

Annexure 2: Additional seats required- Doctors

Group	Study 1		Study 2	
	States	**Additional Seats required**	**States**	**Additional Seats required**
I	Goa, Punjab, Karnataka, Maharashtra, Kerala, Tamil Nadu, (Andhra+Telangana)	0	Maharashtra, Karnataka	
II	Gujarat, Delhi, Uttarakhand,	0	Goa, Delhi, Uttarakhand, Kerala, Tamil Nadu, (Andhra+Telangana)	
III	J&K, West Bengal	190+2320= 2510	Uttar Pradesh, Tripura	4641
IV	Haryana, Himachal	0	Haryana, Gujarat, Manipur, Himachal	0
V	Rajasthan, Odisha, North East, MP, Bihar, Uttar Pradesh, Chhattisgarh, Jharkhand	2201+ 1171= 3372	Chhattisgarh, West Bengal, J and K, Punjab, Meghalaya, Odisha, Jharkhand, Rajasthan, MP, Bihar,	305+ 2320+ 190 + 251+ 113+ 959+ 1464+ 1120+ 1394+ 4375= 12,491
	Total	5,882		17,132

Annexure 3A: Private infrastructure-Medical and Dental practice establishments in 2010-11 (NSSO 67th round)

Sates	Medical Practice Activities				Dental Practice Activities			
Region	Rural		Urban		Rural		Urban	
Type of enterprise	OAEs	Estabs	OAEs	Estabs	OAEs	Estabs	OAEs	Estabs
J&K	264	681	309	753	182	249	341	269
H.P.	1,192	37	15	213	72	48	66	215
Punjab	18,510	1,082	2,624	2,404	64	14	263	307
Uttaranchal	3,273	428	3,176	588	809	176	78	258
Haryana	9,738	668	4,606	6,587	198	19	190	597
Rajasthan	12,071	1,081	5,769	1,589	101	14	539	931
U.P.	1,10,042	4,303	42,677	18,070	889	165	3,345	929
Bihar	21,665	911	3,383	3,594	83	51	146	131
W.B.	32,910	2,664	27,419	3,389	102	55	8	1,972
Jharkhand	5,318	444	762	2,540	-	-	10	181
Orissa	1,987	133	1,147	653		123	11	99
Chhattisgarh	9,796	209	1,983	636	23	-	157	105
M.P.	17,037	3,564	7,777	2,599	626	10	456	710

Gujarat	7,952	1,640	6,465	6,797		68	363	2,441
Maharashtra	11,200	1,611	10,998	16,824	110	7	288	4,424
A.P.	24,557	1,345	6,919	5,616	814	147	1,123	1,203
Karnataka	6,456	1,680	6,179	8,249	-	-	1,970	2,116
Goa	1			80	-	-	-	372
Kerala	1,815	419	9,797	447	-	797	-	3,512
T.N.	1,176	1,716	1,689	11,222	-	105	305	1,622
NE states	277	341	858	575	-	35	12	102
UTs	263	220	8,814	6,404	179	-	739	2,782
All India	**2,97,500**	**25,177**	**1,53,366**	**99,830**	**4,249**	**2,081**	**10,408**	**25,276**

Annexure 3B: Private infrastructure-Ayurveda, Unani and Homoeopath establishments in 2010-11 (NSSO 67th round)

States	Ayurveda practitioners				Unani practitioners				Homoeopath practitioners			
Region	Rural		Urban		Rural		Urban		Rural		Urban	
Type of enterprise	OAEs	Estabs	OAEs	Estabs	OAEs	Estabs	OAEs	Estabs	OAEs	Estabs	OAEs	Estabs
H.P.	101	59	47	-	-	-	-	-	118	-	323	54
Punjab	4,142	95	188	627	-	-	-	-	468	11	3,670	259
Uttaranchal	1,062	35	663	195	-	-	-	-	186	160	-	-
Haryana	2,690	223	1,929	671	-	236	39	113	2,079	-	415	149
Rajasthan	3,714		1,487	106	-	-	-	-	334	-	263	102
U.P.	6,665	492	5,279	2,211	4,235	42	2,515	319	8,919	378	4,475	4,332
Bihar	225		384	56		132	25	212	13,490	323	2,317	411
W.B.	365	16	1,138	154	53	-	42	21	15,609	344	9,901	2,780
Jharkhand	175		88	46	-	-	16	-	2,034	2	672	451
Orissa	5,366	175	523	58	-	-	543	-	555	9	1,101	68
Chhattisgarh	466	66	797	84	28	43		-	2		4	5
M.P.	2,426	53	3,595	137	70	-	523	-	1,800	77	1,824	54
Gujarat	859	18	2,895	958	23	-	405	-	501	80	3,841	3,417
Maharashtra	1,570	229	2,480	1,628	147	-	249	782	3,893	1,313	3,491	2,298
A.P.	1,859	7	758	355		-	230		46	19	957	316
Karnataka	1,069	84	1,437	1,464		-			3,831	153	349	1,745
Kerala	3,059	657	431	549	871	27			1,417	402	2,376	241
T.N.	129	179	1,582	291			171		57	176	747	134
NE states	1,292	59	112	87	1,374	3,114	32	11	448	-	526	771
UTs	43	20	572	1,061	-	56	136	-	-	108	917	645
All India	**37,276**	**2,464**	**26,385**	**10,738**	**6,802**	**3,649**	**4,924**	**1,458**	**55,788**	**3,554**	**38,169**	**18,231**

*This data counts unqualified and informal providers, giving rise to a high numbers in states known to have a weak development. The numbers related to establishments are more reliable, but here too the pattern in not consistent across states and this may be due to sampling issues. So, though this data is being presented, much caution is required in its interpretation.

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