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# Quantity and Quality of Human Resources in Health Care: Shortage of Health Workers in India

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## I Background

Advancements in health care across countries in the world are far better than they were before. Nevertheless, it still remained insufficient and inadequate in meeting the growing demand or otherwise the requirement. Shortage of human resources along with inadequate infrastructure and insufficient health finances are the most important constraints in the health care sector across countries on the globe especially among the poor and developing ones. Health care is one of the most labour-intensive sectors where human resources are so critical. In this respect global community as well policy makers are in fact concerned with addressing the challenges associated with it.

A decade ago, the World Health Organisation (WHO) made a clarion call in respect of critical factor of human resources (i.e. health professionals and workers) in health care sector (WHO, 2006). While assessing the crisis of human resources for healthcare, it observed a serious issue of shortage of health care workforce across the globe. According to WHO (2006) report, there is a shortage of about 4.3 million doctors, midwives, nurses and support workers worldwide. It proposed a strategy for addressing the challenge.

In continuum, recently in May 2014 the WHO made a Declaration on Human Resources for Health (HRH). It is a renewed commitment towards universal health coverage (UHC). Subsequently, the WHO has consolidated the evidence, contributed by many domain experts, who have been working in this area of research across countries, around a comprehensive health labour market framework for universal health coverage (UHC). Consequent synthesis paper followed by consultations resulted in framing of a global strategy in this regard (see WHO, 2016).

One of the significant benchmarks that emerged is identification of a minimum threshold of health workers numerical requirement in achieving certain health outcomes targeted particularly that are part of the Sustainable Development Goals<sup>1</sup> (SDGs) that global community is concerned with (WHO, 2016). Accordingly, it arrived at a threshold level requirement of skilled health professionals and workers. Based on a threshold of 4.45 skilled health professionals per 1000 population, the WHO has estimated that the needs-based shortage of health-care workers globally would be about 17.4 million of which almost 2.6 million are doctors and over 9 million are nurses and midwives (see WHO, 2016). It observed that the largest needs-based *shortages*

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<sup>1</sup> The SDGs indicates renewed commitment of the global community from the Millennium Development Goals that targeted year 2015 towards ensuring basic welfare of the people across globe.

are in countries of South East Asia and African regions. In this backdrop, an attempt is made here to understand the situation of human resources for health in India. An effort in this regard is made to triangulate<sup>2</sup> data from different sources of information for evidence on inadequacy of human resources for health in India. Before probing into the shortage or degree of inadequacy of human resources for health in India, a discussion on criticality of human health for economic development is presented in the following paras.

## **II Investing in Health: Economic Growth and Development**

The World Bank<sup>3</sup> had first looked at gains from investing in Health nearly 25 years ago in 1993. It had argued then that investing in health is one means of accelerating development. Good health increases the economic productivity of individuals and the economic growth rate of countries. Good health is a goal in itself. In the past forty years, life expectancy in the developing world has risen and child mortality has decreased, sometimes dramatically. However, the progress is not enough. The toll from childhood and tropical diseases remains high even as new problems - including AIDS and the diseases of aging populations - appear on the scene. All countries are struggling with the problems of controlling health expenditures and making health care accessible to the broad population.

The World Development Report 1993 (World Bank, 1993) also examined controversial questions surrounding health care and health policy. It advocated a threefold approach to health policy for governments in developing countries and in the former socialist countries. First, to foster an economic environment that will enable households to improve their own health. Policies for economic growth that ensure income gains for the poor are essential. So, too, is expanded investment in schooling, particularly for girls. Second, redirect government spending away from specialized care and toward such low-cost and highly effective activities such as immunization, programs to combat micronutrient deficiencies, and control and treatment of infectious diseases. By adopting the packages of public health measures and essential clinical care described in the report, developing countries could reduce their burden of disease by 25 percent. Third, encourage greater diversity and competition in the provision of health services by decentralizing government services, promoting competitive procurement practices, fostering greater involvement by non-governmental and other private organizations, and regulating insurance markets. These reforms could translate into longer, healthier, and more productive lives for people around the world, and especially for the poor.

### ***Investing in services outside the health sector***

The International Monetary Fund (IMF) in 2004, had asserted the following. First, improving health outcomes is linked not only to the provision of health services, but also to interventions outside the health sector. Access to clean water and education for mothers are both key

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<sup>2</sup> **Data Triangulation** is a technique that facilitates validation of data through cross verification from two or more sources. In other words, it is a method of investigation to produce understanding a phenomenon using multiple data sources. It also means the application and combination of several research **methods** in the study of the same phenomenon.

<sup>3</sup> World Bank (1993). *World Development Report 1993: Investing in Health*, New York: Oxford University Press. At World Bank. <https://openknowledge.worldbank.org/handle/10986/5976> License: CC BY 3.0 IGO.

determinants of infant and child mortality rates. Second, achieving sharp declines in maternal mortality requires behavioral changes in prenatal care and delivery and an improved road network, in addition to improved hospital care. Third, delivering health services effectively requires the coordination of policies across a number of fields. These include: public sector management policies that provide adequate incentives to health care providers; procurement and distribution policies for pharmaceuticals so that these are available in sufficient quantities in the right places; public health measures to protect the population; and suitable regulation and quality control of private providers, who often deliver more health services than public providers.

The European Commission in its document on **Investing in Health** of February 2013 states categorically that average levels of health have been improving across the European Union (EU). Also, it pointed out that data hides major inequalities. Poorer and disadvantaged people die younger and suffer more often from disability and disease. The Commission argued that investing in sustainable health systems combines innovative reforms aimed at improving cost-efficiency and reconciling fiscal consolidation targets with the continued provision of sufficient levels of public services. Investing in people's health as human capital helps improve the health of the population in general and reinforces employability, thus making active employment policies more effective, helping to secure adequate livelihoods and contribute to growth. Investing in reducing health inequalities contributes to social cohesion and breaks the vicious spiral of poor health contributing to, and resulting from, poverty and exclusion. Therefore, it suggested investing in health through adequate support from EU funds.

### ***Health and GDP per capita***

In GDP growth discussions, one latest inclusion is the full income approach that adds life expectancy to the growth calculations. This approach combines growth in national income (GDP) with the value people place on increased life expectancy - that is, the value of their additional life years (VLYs). Global Health 2035 estimates that 24 per cent of the growth in full income in low- and middle-income countries between 2000 and 2011 resulted from health improvements.

Does health influence per capita GDP? How does it do so? Healthy workers are more productive than comparable others who suffer from poor health. Better health raises per capita incomes through saving and expenditure decisions. Retirement schemes and pension accounts raise large resources in countries with high life expectancy. FDI is attracted to environments where labour is not vulnerable to heavy disease burdens. The initial health of a population is definitely a robust driver of economic growth

In the United States of America (USA) alone, Nordhaus at Yale concludes that half the growth in full income in the first half of the twentieth century had resulted from mortality declines, and slightly less than half in the second half. Real income in the USA went up six times and life expectancy went up by 25 years during this period. Clearly, the impact of health on GDP is

substantial - an extra year of life expectancy is estimated to raise a country's per capita GDP by about 4 per cent, for example<sup>4</sup>.

### III Human Resources for Health in India: Health Care Professionals and Workers

There is indeed a dearth of information on many aspects of health care system in India including that of the size or strength of human resources (health care professional or workers) either in public or private sectors. It is so as India is lacking a comprehensive information system on different aspect of health care which is necessary to monitor health outcome and informing the state policy making body to make course corrections for the betterment (Kurien, 2017). Even the recent web-based Health Management Information System (HMIS) an interface to gather information and provide periodic reports on the status of the health sector while monitoring the National (Rural) Health Mission of India (N[R]HM), is also providing partial information in this regard. Rather, we have information on number of health professionals or workers of various categories registered with concerned authorities, for instance, doctors registered with Medical Councils. The discontinued government publication<sup>5</sup> of the **Health Information of India**, used to carry periodically updated information of number of registered doctors, dental surgeons and other paramedics. There was considerable time lag between the publication date and information reference point of time. While discontinuing that publication in 2005, the Government of India has in continuum began the publication of **National Health Profile**, annually.

According to an earlier study (Motkuri and Naik, 2010) that referred to the *Health Information of India 2005*, there were about 0.77 million doctors and 0.055 million dental surgeons (allopathy) serving a little above one billion population in India. Additionally, there were 0.86 and 0.5 millions of general and auxiliary nursing midwives respectively and 0.05 million of health visitors and health supervisors. Together, there were 2.2 million workforce engaged in the health care sector in India. As the study derived it, there was on an average one doctor per 1400 persons and one dental surgeon per forty thousand population; 79 general nurse-midwives and 46 auxiliary nurse midwives per lakh population (see Motkuri and Naik, 2010). In total (including doctors, nurses and other health workers) there were 209 health personnel, working at different levels, per lakh population in India.

From the Government of India's recent **National Health Profile 2017** report, one would find that India is having *one million total number of Doctors* possessing recognised medical qualifications (under Indian Medical Council Act 1956) and registered with any of the State Medical Councils in India and / or with Medical Council of India (as on 2016). Also about *0.2 million are the dental surgeons* registered<sup>6</sup> with either any of the State Dental Councils or Dental Council of India (as on 2016). Besides, *0.8 millions are the number of doctors registered as AYUSH practitioners* in the country. In respect of the paramedics in India, the registered number of auxiliary nurse mid-wives (*ANMs*) in 2015 were *0.82 million*, number of *nurses and mid-wives were 1.9 million*, and the other female health assistants (i.e. *LHVs*) were

<sup>4</sup> The intrinsic value of mortality changes, measured in terms of the value of a statistical life (VSL), is even more substantial.

<sup>5</sup> That is by *Central Bureau of Health Intelligence*, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, New Delhi

<sup>6</sup> As prescribed in the Indian Dentist Act 1948 which is amended recently in 2016.

**0.06 million.** Together, there were **5.49 million health professionals and workers** registered in India.

However, one has to note that the registered number of any category of health professionals or workers does not indicate that all of them are alive and actively rendering their services in the Indian health care system, irrespective of the type of management (public or private). It is an accumulated number over a period ever since the concerned authorities have been set up for the purpose. There is a lower chance of any deletion of those registrations of who are not physically present and / or those who have not been actively rendering their services. Although a majority of those registered health professionals may be serving in India, some of those might have moved out of country to serve elsewhere in the globe (*migration*). As it is observed, India is the largest source of physicians in the USA and the UK, and the second and third largest in Australia and Canada (Ravi, 2017). Along with that some of them might have died due to old age, medical contingencies or accidents (*mortality*); some of them had to terminate abruptly rendering their services due to their physical inability to continue for different reasons particularly that caused by medical contingencies or accidents (*disability*); and some of them might have stopped their services as they become too old to render their services (*aging*). Besides, there are chances of one health professional or skilled health worker making multiple registrations in different state councils or in a state council and the Indian council (*duplication or multiplicity*).

**Table 1: Number of Health Professional / Workers of various categories available in India, 2016**

Sno	Details	Ref. Year	Absolute Number	Number in Millions	No of HW Per lakh Population	Average population per HW
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
1	Registered Doctors	2016	1005281	1.01	76	1320
2	Registered Dental Surgeons	2016	197732	0.20	15	6710
3	Registered AYUSH Doctors	2016	771468	0.77	58	1720
4	Registered ANMs	2015	821147	0.82	62	1616
5	Registered Nurses and Midwives	2015	1900837	1.90	143	698
6	Registered LHVs	2015	56264	0.06	4	23582
7	Registered Pharmacists	2016	741548	0.74	56	1789
8	Govt. Allopathy Doctors	2017	113328	0.11	9	11708
9	Govt. Dental Surgeons	2017	6328	0.01	5*	209671

**Noted:** 1. HW – Health Professional or Workers; AYUSH – includes Ayurveda, Unani, Sidda and Homeopathy; ANM – Auxiliary Nurse Mid-wife; LHV – Lady Health Visitor; 2. \* per 10 lakhs.

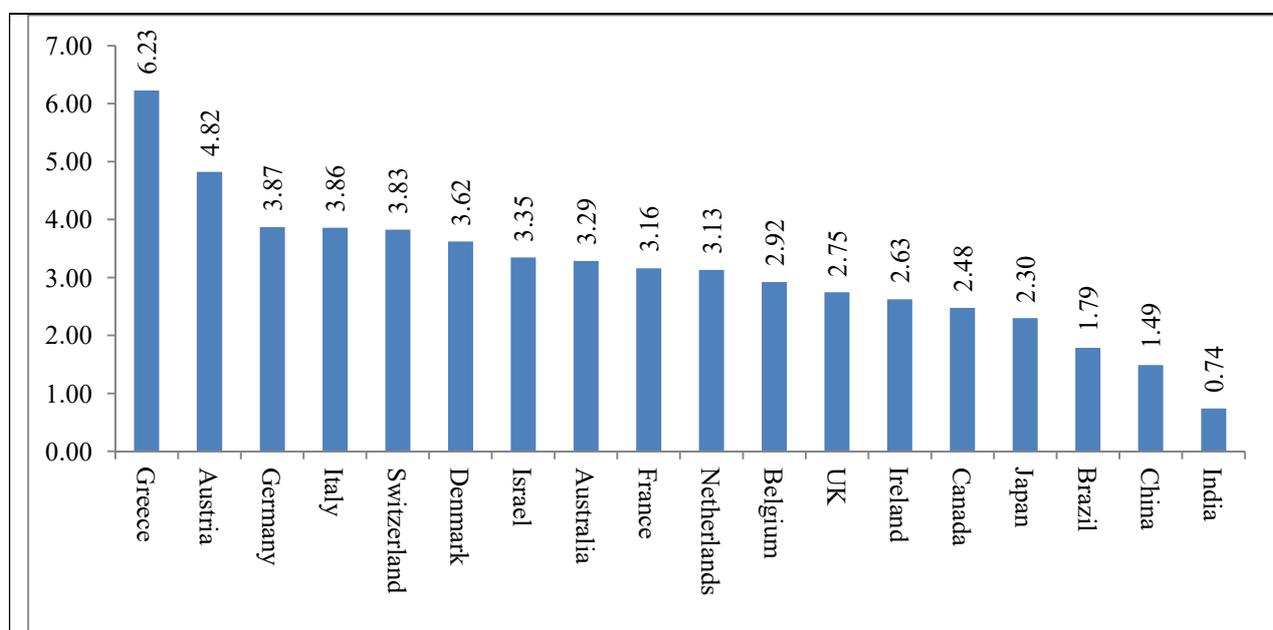
**Source:** 1. GOI (2017); 2. Authors' calculations.

While taking note of the above caveat, if we standardize the registered health professionals across categories to population it is supposed to serve, one can better understand adequacy or inadequacy of the health professionals in the country. According to the United Nation's population projections, the total population of India (as of June 2016) was 1326.8 million. Using this information what one can derive showing that the number of (registered) health professionals or workers per lakh population is as follows: 76 doctors, 15 dental surgeons and 58

AYUSH practitioners (see Table 1). The number of registered paramedics per lakh population is: 62 ANMs, 143 nurses and midwives, 4 LHVs, and 56 pharmacists. If at all, supposing *all of them are active in service* then their probable coverage (a health professional or worker to population ratio) would be derived as: one doctor per 1320 persons, one dental surgeon per 6710 persons, and one AYUSH doctor / practitioner per 1720 persons. Similarly, the ratio of paramedics to population would be: one ANM per 1616 persons, one nurse/midwife per 698 persons, one LHV per 23582 persons and one pharmacist per 1789 persons (see Table 1).

The cross-country comparisons based on WHO's data shows that while India has the density of doctors (i.e. number of doctors available per 1000 persons) less than one, developed countries have such density of doctors at three to four (see Figure 1; also see WHO, 2016). It indicates that the density of doctors in India is 3 to 4 times lesser than that of developed countries. Similar is the case of density of the other health professionals and workers for which too India has been lagging behind (see WHO, 2016).

**Figure 1: Density of Doctors (Physicians) across Selected Countries, 2011**



**Note:** Density – Number of Doctors per 1000 population.

**Source:** WHO.

If we apply the WHO's standardized threshold (of 4.45 skilled health professionals per 1000 population), India needs about 5.9 million health professionals and workers given its population as 1326.8 million in 2016. As per the registration information of concerned authorities, the total number of health professionals or workers registered in India is about 5.49 million as on June 2016. It still indicates the **shortage of more than 0.4 million (or about 4.1 lakhs) health professional and workers** in the country. If we take note of the caveat mentioned above, the shortage would shoot up depending on the size (or proportion) of those who are not actively rendering their service among the registered health professionals and workers.

One of the major drawbacks of the published information in official documents / reports on health care system in India is that the data at most is reliable with respect to the public sector

health care (Motkuri and Naik, 2010). Other than registration data kept with concerned authorities, there has not been much of information on the human resources engaged in the private sector health care in India. According to the *National Health Profile's* information, there were about 0.11 million allopathic doctors and 0.01 million dental surgeons working in the Government sector, in 2016 (see Table 1). This number definitely indicates the actual availability and would be reliable. The government sector includes rural health centres (PHCs and CHCs), area and district hospitals, and any other government hospitals. Their availability is 9 doctors per lakh population and 5 dental surgeons per ten lakh population. In terms of coverage of population, it is about 12 thousand population for each doctor to serve and more than two lakh population for each dental surgeon. It presents a partial picture of the strength of human resources for health in the Indian health care system. It is so because we do not have such definite and reliable information on size and strength of human resources engaged in private health care system in India. As mentioned above, even the HMIS is not covering the private sector.

The private health care system in India has witnessed remarkable growth during the last two decades especially during the post-reform period. It ranges from petty health clinics and nursing homes to multi-speciality hospitals on a large scale and managed under the corporate structure of governances. Given the cost advantage of Indian health care sector at international market prices, the corporate sector in this respect is attracting even the international patients and facilitating health tourism. For instance, Apollo Hospitals' recent annual report claims that it has patients from 120 countries around the globe (see Apollo, 2016). There has not been any effort in respect of assessing the size and strength of the private health care system. The Apollo Hospitals' recent annual report claims that it has more than 9 thousands beds capacity and nearly 60,000 dedicated health care providing staff (including doctors and other paramedics) in its group of hospitals across cities in the country (see Apollo, 2016). There are many such corporate and non-corporate multi-speciality hospitals in India along with clinics and nursing homes.

In this regard, one can refer to a study that made attempt to provide a more comprehensive picture of the strength of health care system in India (see Motkuri and Naik, 2010). It made an estimation based on NSS 61<sup>st</sup> (2004-05) round Employment and Unemployment survey which followed the National Industrial Classification (NIC 1998) of activity. The study has shown that at all India level ***there were 3.4 million health workers*** who were actively rendering their services in the country covering its more than one billion population. It included health workers of all categories (doctors, specialists, paramedics, laboratory technicians, pharmacists and so on) in both the private and public sectors. The workforce in health care services account for nearly 0.73 per cent of the total workforce of the country (Motkuri and Naik, 2010). The standardised availability of health professionals and workers per lakh population indicates that there were 343 health workers per lakh population in India. At the state level, as the study observed Kerala (527) has the highest number of health workers per lakh population followed by Delhi (513), Maharashtra (482), Tamil Nadu (405), Himachal Pradesh (400) while Orissa (161), Assam (158) and Bihar (140) having the lowest figures. In terms of rural-urban distribution, the study observed that health workers constituted 0.37 percent of the total workforce in rural areas and 1.8 percent in urban areas. In absolute terms, urban areas had 62 per cent of the total health

workers indicating the locational disadvantage of the rural population in accessing the services of health workers concentrated in the urban areas (*ibid*).

Despite such sporadic attempts, there have not been many efforts in respect of understanding the size and strength of the health care system in India particularly in terms of its human resources (health professional or workers serving in India). As mentioned above, the dearth of information continued to persist. In this respect, one can also explore the Census of India information as well. Some of the B series Tables of the Census of India provides number of workers by industrial classification as well as by classification of occupations. The Census 2011 data related to these B Series Tables is yet to be released at this moment; we have information of Census 1991 and 2001. While the Census 1991 had followed the National Industrial Classification of 1987 (NIC -87), the Census 2001 had followed that of 1998 (NIC -98) for classification of workers by the industry or activity that they engaged. In the **NIC-87**, the Group 930 of Division 93 in Section 9 and that in the **NIC-98**, Group 851 in Division 85 represents the activities related to human health<sup>7</sup>. It is more comprehensive data in terms of its coverage wherein it covers both the public and private sectors. Notwithstanding that one must be cautious about a caveat on the Census information is that it is so comprehensive that it includes all the workers in the health care sector. Along with skilled health care professionals (allopathy), paramedics and the other workers, practitioners of various forms of Indian Medicine, it also consists of laboratory technicians, pharmacists, even the unqualified private medical practitioners who have been predominant in rural areas, and other personnel of administration and management in health care institutes (i.e. hospitals etc). Such a caveat is applicable even to the coverage of health workers in the NSSO survey that is referred to in the para above.

Based on the information of Census by its industrial classification of workers, one could find that total number of workers engaged in the activities related to human health care (main and marginal category together) was nearly 1.89 million in 1991 and it increased to 2.35 million in 2001. According to Census the population of India was 838.6 million in 1991 and 1028.7 million in 2001. Given the size of population in the country and WHO's threshold (of 4.45 health workers per 1000 population), it could have required nearly 3.73 and 4.58 million skilled workforce for its health care services respectively for the years 1991 and 2001. It shows that even if we set aside the caveat on the Census information mentioned in the para above, the obvious **shortage of skilled health professional and workers in 1991 was 1.85 million and it was 2.23 million in 2001** and it would shoot up if we take into account the caveat on Census information. Hence, one can certainly make a point that Indian health care system is suffering from shortage of human resources particularly the skilled health professionals and other workers. The evidence based on data triangulation of various sources of information establishes such shortage although the degree of shortage varies with the source and its coverage.

### ***Is it due to Shortage of the Qualified / Trained Personnel?: Intake of Medical Education***

However, the problem of shortage of human resources required in health care sector in India or elsewhere must be seen in terms of shortage of human resources in terms of the non-availability

<sup>7</sup> The activities in human health group is further categorised into five (930.1, 2, 3, 4 and 9) classes of workers in NIC-87 and three (8511, 8512, and 8519) classes of workers in NIC-98.

of qualified persons as such and the shortage of services of the qualified persons available. The latter one involves the under-employment and unemployment of available graduates or qualified persons in medical sciences along with the absenteeism and shirking of duties among those employed health workers especially in the public sector. As we have observed above, there is a shortage of human resources that is the availability of qualified persons for health care services in India. The shortage of services of qualified health workers particularly among those employed in service, due to absenteeism and shirking from performing duties is discussed in one of the following sections.

The shortage of human resources that is non-availability of the qualified persons is something a problem that associated with the education and training system of the country. Medical education system is to train the qualified students and finally produce sufficiently qualified persons to handle the health care needs of the society / country. Under-graduation level is the entry point for the courses associated with medical sciences and / or health care services in India. This is the only feeder channel for the further higher level of tertiary level courses (Post-graduation) associated with medical sciences and / or health care services. Enrolment at the under-graduate level to a large extent reflects the intake capacity of the medical education system.

**Table 2: Enrolment in Under-Graduate Courses associated with Medical Sciences or Health Care: All India**

<i>Sno</i>	<i>Discipline/subjects</i>	<i>2015-16</i>	<i>2014-15</i>	<i>2013-14</i>	<i>2012-13</i>	<i>2011-12</i>
1	<i>Nursing</i>	208882	193238	184194	157768	127980
2	<i>General Medicine &amp; General Surgery</i>	191847	168686	149902	132671	99587
3	<i>Dentistry</i>	89910	82763	73178	62808	54052
4	Medical Sciences and Ophthalmology	45067	36990	19002	8049	15487
5	AYUSH	106174	92055	77230	69246	49817
6	Pharmacy & Pathology	208603	194459	174899	138540	123513
7	Physiotherapy & Occupational Therapy	45701	38095	30089	24623	16641
8	Medical Management & Hospital Admn.	3580	4987	4054	3312	2224
Total		899764	811273	712548	597017	489301

**Note:** AYUSH – includes Ayurveda, Unani, Sidda and Homeopathy.

**Source:** GOI (2016) All India Survey of Higher Education.

The information on enrolment culled out from the *All India Survey on Higher Education* (see GOI, 2016) indicated that during the last five years between 2011-12 and 2015-16 there is a considerable increase in enrolment in under-graduate courses related to medical sciences and those related to health care services, in the country (see Table 2). Such an increase is remarkable particularly between 2011-12 and 2012-13. At all India level, the enrolment in General Medicine and Surgery (i.e. MBBS) increased from nearly one lakh in 2011-12 to 1.9 lakh in 2015-16 while that in dentistry (Dental Surgeon – BDS) increased from 0.54 lakh to 0.9 lakh in the same period. The enrolment in nursing has increased from 1.27 lakhs to 2.08 lakh during the same period. In the courses of Indian system of medicine (AYUSH – includes Ayurveda, Unani, Sidda and Homeopathy), the enrolment increased from nearly 0.5 lakh to 1.06 lakh during the last five years period. Similarly, one can observe the considerable increase in enrolment in the other courses related to health care services as well. A large part of the increase in enrolment is owing to emerging private sector in the field of education including that of medical sciences.

This enrolment may not directly translate into or reflect the qualified health care professionals and workers available in India. One has to take note that this enrolment figures is an accumulated number over the course cycle. For example, the enrolment in General Medicine (MBBS) consists of full course cycle of five years (4+1 years), and that for nursing it is a cycle of three years. The enrolment at entry level (i.e. first year of the course) is nearly one-fifth of the total enrolment in the course cycle for MBBS and one-third for Nursing. But due to certain attrition, the enrolment in second year would be little less than the first year of the course cycle and it is so for the subsequent years of study in the course cycle. Besides, as one could observe that there has been a year to year increment in the number of seats available (i.e. intake capacity) owing to growing number of institutions or increase seats of existing institutions, the number of seats available now are higher than the year before and so on. Based on the recent discourse on National Eligibility cum Entrance Test<sup>8</sup> (NEET), it is observed that the total number of seats available for the under-graduate course of medicine (MBBS) in institutions of medical sciences all over India is around sixty two thousand. The intake capacity must be little lesser in the previous year and so on.

There is a considerable gestation period ranging from five to ten or fifteen years by the time they finish their graduation and training in medical sciences and getting into health care services. Definitely certain proportion of graduates from under-graduation course would go for higher studies and research. One has to account for certain *attrition rate* owing to dropouts and / or stagnation in the under-graduation level courses as well as in the post-graduation levels. Among the out-turns / pass-outs, given the *diverse career options* such a teaching, research and development, health insurance sector and emigration finally how many of them would enter directly into the health care service providing industry (public or private sector) in India need to be looked into. However, it needs an in-depth longitudinal analysis probing into proportions of a cohort that entered into medical courses at a point of time and finally after due gestation period entered into medical profession or health care service. Based on such an analysis one may arrive at a minimum annual production of qualified persons in medical sciences available in the country.

#### **IV Rural Health Care: Public Health System, Staffing Pattern, Norms and Shortages**

Health care in rural areas has been a cause of concern for a long time. Most of the private sector health care in India is concentrated in its urban areas (towns and cities) and rural population does not have any option but they have to depend on public health care facilities. The inadequacy in availability of public health facilities in rural areas and their ineffective and inefficient functioning of the existing facilities as well became cause of concern in India. There is not only shortage of health facilities required but also lacunae in utilizing the potential capacities of existing facilities in a most effective and efficient manner.

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<sup>8</sup> It is for admission to MBBS/BDS Courses in India in Medical/Dental Colleges run with the approval of Medical Council of India/Dental Council of India under the Union Ministry of Health and Family Welfare, Government of India except for the institutions established through an Act of Parliament e.g. AIIMS and JIPMER Puducherry. It is conducted first time at national level single entrance test in 2017.

Only solace for rural areas in terms of health care is availability of local *Private* or *Registered Medical Practitioners (PMPs / RMPs)*. In most of the cases they (P/RMPs) are unqualified and unregistered medical practitioners (see Narayana, 2006). They are so predominant in rural India that as a research study has shown while enumerating them, there were about 3000 such P/RMPs in a district<sup>9</sup> consisting of nearly 3000 villages / hamlets (see Narayana, 2006). It shows that there was at least one P/RMP per village / hamlet. According to another estimate for India, there were more than five lakh such P/RMPs in the countryside (see Narayana, 2004). The rural India consists of little more than 6.4 lakh villages of various sizes, of which more than 2.0 lakh villages have population less than 500 (Census 2011). Most of the remote and tribal areas / villages may not have even such type of health care providing agents.

Under the Minimum Needs Programme (MNP) / Basic Minimum Services (BMS) programme, certain health facilities have to be established and maintained by the State, mostly the Provincial or State governments in a federal structure (GOI, 2015). As per the Indian Public Health Standards (IPHS), there should be one sub-centre health facility for every 5000 population in plain areas and 3000 population in hilly areas. Similarly, there should be one primary health centre (PHC) for every 30000 (Plain) / 20000 (Hilly) population, one community health centre (CHC) for every 120000 (Plain) / 80000 (Hilly) population. It is altogether a different issue if the norm set up long ago (four decades ago) serves in the contemporary situation of growing demand for health with increasing awareness and complexity of health problems. These norms too do not ensure any health facility in the neighbourhood or nearest (walking) distance. The increasing communication facilities with expanding road and transport facilities made easy the reaching out to the nearest among the distant health care facilities. But the transaction costs involved with transport costs, travelling time and waiting time due to overcrowding at the facilities could not be avoided. Such transaction costs must be due to inadequacy of health care facilities.

**Table 3: Rural Population (in Millions) of India**

Sno	Population	2011	2016*
1	Total Population	1210.8	1326.8
2	Rural Population (incl. STs)	833.7	891.6
3	Rural Tribal (ST) Population	94.1	100.6**
4	Population of Census Towns	52.8	60.9***

**Note:** 1. The above figures are in millions, as on 1<sup>st</sup> March 2011 and June. 2016; 2. \* Projections based on UN (2015); 3. \*\* based on the projection taking into consideration the percentage of STs in rural India would be 11 per cent of the rural population; 4. \*\*\* based on the percentage of CTs considered as 14 per cent of the urban population.

**Source:** 1. Census of India; 2. UN (2015).

Even by those IPHS norms the existing public health care facilities are insufficient. According to the United Nation's population projections, the total population of India as of June 2016 was 1326.8 million and 32.8 per cent of them were living in urban areas (see UN, 2015). From this

<sup>9</sup> That is of Khammam district in Telangana state. When the study was undergoing the district was part of undivided state of Andhra Pradesh. As per the 2011 Census, the number of inhabited villages in the Khammam district was 1103. They are Census (Revenue) villages. In many cases, each of the village may be having hamlet villages more than one.

one can derive that the rural population would be 891.6 million accounting for 67.2 per cent of the country's population. Given the size of rural population and following the norms of IPHS there should be a minimum of 1.78 lakh sub-centres, around 30 thousand PHCs and more than seven thousand CHCs in serving the rural population of the country. If we take into account the norm referred for tribal areas, the requirement of health centres would be even more (see Table 4). The IPHS norm for tribal and hilly areas is little different and hence it has to be taken into consideration that norm as well while conducting an exercise on requirement of rural health facilities for the country.

Further, one has to consider the population of Census Towns which have been usually ignored in both the rural and urban development programmes and schemes. Urban areas are usually differentiated by their administration categories. The Statutory Towns are administered by the Statutory Urban Local Bodies (SULB) and the Census Town (CTs) which are still administered by gram panchayats (Pradhan, 2013, Mukhopadhyay *et al.*, 2016). The latter category of urban areas (i.e. CTs) are so by definition based on the criteria consisting of three indicators (size of population, density and occupation distribution) and identified so during decennial Census operation of the Registrar General of India. Any of the urban development programmes or schemes has not been extended to these second order urban areas i.e. Census Towns. Except, a few Census Towns which become part of Out-Growth (OG) centres while being located adjacent to a statutory city or town, most of the Census Towns are away from statutory urban local bodies. They do not have access to any of the urban provisions. The CTs account for 14 per cent of the total urban population<sup>10</sup> of the country in 2011 (Pradhan, 2013, Mukhopadhyay *et al.*, 2016). In this respect as the population of Census Town is usually and eventually served by the rural health facilities one has to consider them in rural planning at least until they are provided with provision ensured to other urban local bodies which are by nature statutory (SLBCs). Therefore, if we take into account accordingly the population of Census Towns, the requirement of rural health centres would further shoot up (see Table 4). For deriving the population of CTs in 2016, we have considered the 14 per cent of the urban population.

Against such requirement considered above, the *Rural Health Statistics* information related to existing number of centres, however, shows that there are 1.53 lakhs sub-centres, twenty five thousand PHCs and little more than five thousand CHCs in India in 2015 (see GOI, 2015). The coverage of population and areas by the existing health facilities in rural areas shows that on an average a Sub Centre covers 5426 persons, a PHC covers 32944 persons and a CHC covers 154512 persons in 2015. The average rural area (Sq. Km) covered by a Sub Centre is 20.27 Sq. Kms., a PHC is 123.09 SqKms and a CHC 577.32 SqKms. The average radial distance (Km) covered by a Sub Centre is 2.54, PHC is 6.26, and CHC is 13.55. Average number of villages covered by a Sub Centre is 4, a PHC is 25, and a CHC is 119 (see GOI, 2015). The ratio of available health centres by level indicates it is 6:1 for sub-centres to PHCs and it is 5:1 for PHCs to CHCs.

<sup>10</sup> There were about 38946 Census Towns in 2011. There is a surge in the number of CTs and their population during the last decade (2001-11) (see Kundu, 2011, Bhagat, 2012, Pradhan, 2013, Mukhopadhyay *et al.*, 2016). It is observed that the emerging Census Towns account for nearly 40 per cent of the growth in the urban population during the last decade (Bhagat, 2012). As a result their (CTs) contribution to the total urban population of the country doubled from 7 to 14 per cent during the period 2001-11 (Pradhan, 2013, Mukhopadhyay *et al.*, 2016).

**Table 4: An Estimate of Required number of Rural Health Centres in India, 2015**

Sno	Details	Sub-Centres	PHCs	CHCs
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
1	<b>Norm*</b> : Population per Centre (Plain / Hilly area)	5000/3000	30000/20000	120000/80000
2	Total Number of Rural Health Centres required for usual rural population ( <i>a minimum</i> )	178322	29720	7430
3	Total Number of Rural Health Centres required for non-ST Rural & ST Rural population ( <i>a medium</i> )	191740	31398	7849
4	Total Number of Rural Health Centres required for non-ST Rural, ST Rural population and Population of Census Towns ( <i>a maximum</i> )	203925	66428	8357
5	<b>Existing (actual) Centres (as on 31<sup>st</sup> March 2015)</b>	<b>153655</b>	<b>25308</b>	<b>5396</b>
	<i>Minimum Shortage: Difference (2-5)</i>	24667	4412	2034
	<i>Medium Shortage: Difference (3-5)</i>	38085	6090	2453
	<i>Maximum Shortage: Difference (4-5)</i>	50270	8120	2961

**Note:** 1. \*Indian Public Health Standards (IPHS); 2. Based on projected population (see Table 3).

**Source:** GOI (2015) and Authors' calculations.

When we compare the requirement as per the population norms of IPHS and the existing number of health centres in India, it indicates a considerable level of shortage in terms of availability of health facilities in rural areas (see Table 4).

### ***Shortage of Human Resources in Rural Health Centres***

The shortage is not only in terms of required number of facilities but also it is even more in terms of human resources for health. On the one hand inadequate health facilities reflect the shortage of human resources required (no facility no staff). On the other, the existing facilities too fall short of required strength of health professional and workers.

The staffing structure as per the norms of the Indian Public Health Standards (IPHS) indicates that each Sub Centre is required to be manned by at least one female health worker / Auxiliary Nurse Mid-wife (ANM) and one male health worker (GOI, 2015). Besides, under National Rural Health Mission (NRHM), there is a provision for one additional (second) ANM on contract basis. One lady health visitor (LHV) is entrusted with the task of supervision of six Sub Centres. Being the first contact point, a Sub Centre is expected to build interpersonal communication in order to bring about behavioral change and provide services in relation to maternal and child health, family welfare, nutrition, immunization, diarrhea control and control of communicable diseases programmes (see GOI, 2015). The ANMs are critical human resource at the sub-centre level. Also, at the village level under the NRHM Plan of Action relating to Infrastructure and Manpower Strengthening, one of the components was to have a village level health volunteer - the Accredited Social Health Activists (ASHA). Every village/large habitation will have a female ASHA chosen by and accountable to the Panchayat and she is to act as the interface between the community and the public health system. States were asked to choose State specific models in this regard (see GOI, 2015).

A PHC is to be manned by a Medical Officer supported by 14 paramedical and other staff. Among them are the one Auxiliary Nurse Mid-wife (ANM) / female health worker and one Nurse Mid-wife / staff nurse. In addition, under NRHM, there is a provision for two additional staff nurses at PHCs on contract basis. A PHC acts as a referral unit for 6 Sub Centres and has 4 to 6 beds for patients (GOI, 2015). The PHCs are to provide curative, preventive, promotive health care and family welfare services. Similarly, a CHC is required to be manned by four medical specialists i.e. surgeon, physician, gynecologist and pediatrician supported by 21 paramedical and other staff. It has to be equipped with 30 beds in-patient care and with one operation theatre (OT), X-ray, labour room and laboratory facilities. It serves as a referral centre for 4 PHCs and also provides facilities for obstetric care and specialist consultations (GOI, 2015).

Inadequacy in availability of sufficient staff as per the IPHS norms in the existing centre has been remained a constraint in the rural health care system in India. As per the existing staff information, on an average a female health worker (ANM) at a Sub-Centre was serving about 3929 persons in rural areas and a male health worker was serving 14980 persons (GOI, 2015). It indicates that their catchment population / area has been growing beyond the capacity of the health workers. Further, given the existing number of sub-centres and PHCs, the total Female Health Workers (ANMs) in position in 2015 were 212185. As per the *Rural Health Statistics* information still more than twenty thousand posts have remained vacant when compared to sanctioned positions (see GOI, 2015). Similarly is the case with the shortage of staff nurses in PHCs and CHCs. In PHCs, about 34750 positions for doctor were sanctioned but the doctors in position in these centres in India were 27421 and the rest remained vacant. There is a considerable gap in the requirement and the staff in action.

**Table 5: Requirement of various categories of Health Professional and / or Workers in Rural Health Centres in India, 2016**

Sno	Health Professionals	Existing Staff	Staff Requirement		
			Minimum	Medium	Maximum
1	2	3	4	5	6
1	Medical Officers / Doctors – PHCs & CHCs	31499	62413	65935	70200
2	Health Worker (Female)/ANM – SCs & PHCs	212185	405682	435622	463343
3	Nurse Mid-wife (Staff Nurse) - PHCs & CHCs	65039	148230	156595	166725
4	Health Assistant (Female)/LHV – PHCs	16480*	31206	32967	35100
5	Health Worker & Assts. (Male) – SCs & PHCs	69090*	218444	234295	249222
6	Pharmacists - PHCs & CHCs	23131	39008	41209	43875
7	Laboratory Technicians - PHCs & CHCs	17154	39008	41209	43875
8	Radiographers - CHCs	2150	7802	8242	8775

**Notes:** 1. Existing Staff is as on 1<sup>st</sup> March 2015 based on Rural Health Statistics and National Health Profile, Government of India (GOI, 2015; 2017); 2. \* the information from GOI (2017); 3. The Staff Requirement includes the attrition rate at 5 per cent level.

**Source:** 1. GOI (2015) and GOI (2017); 2. Authors' Estimates.

Notwithstanding that if we apply the staff requirement per centre to total number of rural health centres required as presented in Table 3, one can derive the total requirement of the health professionals. For instance, if we consider the requirement of two ANMs per sub-centre (one

regular and one on contract) and one ANM in PHC, the total ANMs required in the Sub-Centres and PHCs would be requiring a total of more than four lakh ANMs for rural India. If we add the attrition rate at five per cent, the requirement of these ANMs further shoots up to more than 4.5 lakhs at a maximum (see Table 5). Accordingly, the approximate requirement estimation for various categories of health professionals or workers required at rural health centres at various levels are presented in Table 5 (a detailed one is presented Table 1A in Appendix).

If we see the requirement against the number of ANMs in position (available), it indicates that the country has **shortage of more than two lakhs of female health workers / ANMs** to be served in Sub-centres and PHCs. Similarly, the requirement of doctors or medical officers at PHCs and specialists at CHCs for the required rural health centres is between sixty to seventy thousands. The number of these doctors in position at the existing centres (PHCs and CHCs) is little above thirty thousand. It indicates that availability is less than half of the requirement and there is **a shortage of more than thirty thousand doctors for PHCs and CHCs** in India. In case of **Staff Nurses, the shortage is more than one lakh and there is a shortage of twenty thousand LHVs**. The **shortage in male health assistants and workers in sub-centres and PHCs is more than one-and-half lakhs**. In this way one can find the shortage in pharmacists, radiographers and laboratory technicians. The acute shortage is obvious across the category of health professional required for the rural health centres.

The shortage would be even more phenomenal if we apply the WHO's standard threshold of 4.45 skilled health professional and workers per 1000 population. Accordingly, for the 952.5 million population of rural areas and census towns it requires 4.2 million such skilled health professionals and workers. Even if one set aside the population of Census Towns, the usual rural population (of 891.6 million) requires about 4.0 million such skilled health professionals and workers. But the rural health care centres (of public sector) consists of merely 4.3 lakh (i.e. 0.43 million only) such health professionals and workers. Obviously, **the shortage would be not less than 3.5 million** in the countryside. It is very unlikely that a qualified doctor would go and open even a petty clinic if not a nursing home or hospital in any of the villages in India irrespective of the size of the village. It definitely indicates the responsibility of the public sector health care system. Along with shortages of human resources in public health care in rural India, as most of the skilled health professionals and workers engaged in private sector have been concentrated in urban areas the overall gap between requirement and availability is huge in rural India.

#### ***Effective shortage due to Absenteeism and Shirking: Lack of Accountability***

The effective shortage of service providing health care human resources especially in rural areas is even more due to absenteeism and shirking of health workers in position. This shortage reflects more of the shortage of services. In a multi-country survey in which the enumerators made unannounced visits to health facilities and recorded whether they could find health workers in the health facilities, observed that about 40 percent of health workers were absent in India (see Chaudhary *et al.*, 2006, Kremar *et al.*, 2005). Although the focus of the survey was on whether providers were present in their facilities, it also observed that many providers who were at their facilities were not working. In India, one-quarter of government health workers were absent from facility, but only about one-half of the health workers were actually working when enumerators arrived at the facility. It is found that absence rates are generally higher in poorer

regions and absence is typically fairly widespread, rather than being concentrated on a small number of workers. Higher-ranking and more powerful providers, such as doctors, are absent more often than lower-ranking ones, men are absent more often than women and health workers from the local area are absent less often (*ibid*).

### ***Quality of Health Workers: Skills, Empathy and Accountability***

The quality of health workers in health care sector encompassing skills, empathy, accountability, professionalism, ethos, values and so on has become cause of concern as well. Besides, it also matters for the quality of health professionals and workers, the facilities and provisions for their pre-service and in-service training and orientation programmes. Although the quality of health care would be influenced by many other factors as well but the quality of health worker definitely improves and hence one of the critical factors in the quality of health care. Besides the medical qualifications, training and skills, empathy is a quality that is required for medical professionals (Jaffrey, 2016).

The WHO (2006) suggested six dimensions of quality health care namely, effective, efficient, accessible, acceptable / patient-centered, equitable, and safe. While translating these six dimensions into reality, though the role of technology is not discounted, ultimately, the human resources become very critical. It is pertinent to note that health care is labour intensive<sup>11</sup> and the success and quality of health care system is determined by the deployment of well-trained and sufficient health personnel providing services. Dussault (1999) identified five sub-dimensions to assess the quality of performance of human resources in health sector. They are: coverage, productivity, technical quality, socio-cultural quality and organizational stability. These five sub-dimensions are in turn influenced by three main processes namely, the development of competencies (here comes the knowledge, skills and attitudes required), the deployment of workforce between the priority sectors in various regions and sub-regions of the country and finally, the management of workforce (see Dussault, 1999).

### **V The Policy Concern**

As it is observed above, there is a huge shortage of health professionals and workers of various categories in the Indian health care system. The policy concern must be addressing these challenges. One of the concerns in this regard is supplying the required skilled health professionals and / or workers. The other one is motivating and making the frontline service providing agents to work especially those engaged in the health care system of public sector. It really is concerned against the observation of lack of accountability and absenteeism and shirking of duties by the health workers in the public sector.

### ***Supplying the skilled health professionals and / or workers: Education and Training Systems***

As the WHO's cross-country comparison data shows that the density of doctors (Physicians) is less than one and it is very low when compared to that of China and other developed countries

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<sup>11</sup> "Health care is a highly labour intensive service with labour accounting for 50-75% of total costs. Any change in the structure, delivery organization and finance impact directly on the workforce and vice versa. Consequently, it would be too simplistic to consider the workforce just as an important cost factor" (Ullrich, 1998 as referred to in Dussault, 1999).

(see Figure 1). Density of doctors here is the number of doctors available for 1000 population. The density of doctors in India is less than half of that of China. If we compare with any one of developed country with a moderate density of doctors available, one would observe that India has 4 to 5 times lesser density. Unlike the other labour markets wherein demand side problems usually prevail, here in health care sectors there is a supply problem as well. There is a shortage of supply of qualified and skilled health professionals in India.

For supplying the required skilled health professionals and workers while meeting the needs of growing population, the education and training system that particularly relates to medicine and /or health is crucial and a critical factor. In order to serve or handle the medical care needs of the population, the country needs to train the medical personnel through medical education system (Thomas, 2017). Indeed, with 343 medical colleges/schools (allopathic), India is the largest country in the world<sup>12</sup> (Ravi, 2017; Ravi *et al.*, 2017). Despite having such a highest number of medical colleges (it is more than double that of China), India has been lagging behind in producing sufficient qualified persons in meeting requirement of the health care services sector in the country to ensure universal health care.

In this regard, the medical education and training system of the country has to be tailored / moulded in the lines of growing population and its emerging health care needs. Indeed the *Bhore Committee* in 1946 on the eve of independence followed by post-independence *Mudaliar Committee* in 1962, *Shrivastav Committee* in 1975, *Bajaj Committee* in 1986, and the very recent *High Level Expert Group on Universal Health Coverage* in 2011 all have examined the challenges of medical education and suggested measures for improvement (Thomas, 2017). However, the recent WHO report observed that the chronic under-investment in education and training of health workers and the mismatch between education strategies in relation to health systems and population needs are resulting in continuous shortages (WHO, 2016). As it is said medical education is the beginning of a process to produce a cadre of personnel who need to be deployed rationally to achieve the health goals of the country (Thomas, 2017).

Along with individual health care (in or outpatient) associated with hospitals and / or health care centres, there is a desperate requirement for the **Public Health or Community Health / Medicine**, which deals with the preventive medicines and promoting health (see Rai and Tulchinsky, 2017; Fernandes, 2017). Besides, **Emergency Health / Medical Services (EHS / EMS)** is an emerging area of health care industry where it provided pre-hospital emergency services and inter-facility patient transfers involving care and transportation. It also needs trained and skilled professional as it is responsible for providing emergency and primary health care to patients outside of hospital. As one would observe, there is a growing number of 108 emergency medical services meant for the purpose in India irrespective of the management (public or private). Despite the growth of such services, still there is a considerable shortage of services and human resources in this arena as well.

Education and training in respect of *public health* is meagre in India. It is observed that as of now there are 23 institutions in India offering courses for the degree, master of public health

<sup>12</sup> It is according to the World Directory of Medical Schools, in 2016. Surprisingly, Brazil is a distant second with 193 medical colleges and China having population more than India but it has less than half of the Medical colleges that India is having (Ravi, 2017).

(MPH) (Rai and Tulchinsky, 2017), along with little more than 900 medical postgraduate seats in community medicine, as well as 90 seats for a diploma, which offers a comprehensive postgraduate training in public health that is however recognised by the Medical Council of India (MCI) (Keshri, 2017). The Bhore Committee long back in 1946 had recommended to introduce preventive medicine as one subject of medical undergraduate training (Rai and Tulchinsky, 2017; Keshri, 2017). Despite the fact that all the commissions / committees of post-independence period as well reiterated the same, such a concern has not been adequately given attention in the policy making since independence.

Therefore, the policy concern must be production and the management (employing/deploying and distributing) of the health care sector workforce (Dussault, 1999). It requires sensitizing the decision and policy-makers and their advisers to the role of workforce policies that are related to health sector (*ibid*). Given the huge shortage in supplying qualified health professional, it requires the *quantitative expansion* without compromising the *quality* of the medical education, especially in the public sector taking into account the equity concerns ensuring / providing equal opportunities (Ravi, 2017; Thomas, 2017). It has to be complemented with sufficient infrastructure and human resources for teaching and training. Such a quantitative expansion is needed in basic medical education and that of postgraduate level. Besides, the critical continuous professional development training or education has to be strengthened as well<sup>13</sup>. These aspects take care of the production part, which need to be complemented by taking care of the management part. It involves addressing the deployment and distribution of workforce across regions and particularly the rural areas, the situation which is highlighted above. Secondly, the needs-based gap needs to be identified and addressed.

### ***Motivating and Making the Frontline Service Providing Agents to Work: Incentives and Monitoring Mechanism***

The deployment of human resources, their distribution across areas particularly in rural and remote areas, and their retention along with motivation and accountability are critical factors in any health care system. The concern is what motivates the regiment of grassroots level service providers of health services i.e. all categories of health workers/professionals. The World Development Report 2004 provided a practical framework for making the services that contribute to human development work for poor people (see World Bank, 2004). It considered the crucial aspects by enabling the poor to monitor and discipline service providers, by amplifying their voice in policymaking, and by strengthening the incentives for providers to serve the poor (*ibid*). In this regard, as it is required for the proper monitoring mechanism and as a strategy various levels of community monitoring especially in case of public sector health care system may have to be introduced.

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<sup>13</sup> Further, the standards for these basic medical education, postgraduate medical education, and continuing professional development have to be improved. For all this, the Medical / Dental Council of India (MCI and DCI) has so far been conferred / concerned with such authority. Proliferation of medical education institutions in the private sector has been a cause of concern as it tended to be compromised with quality. In view of the controversy around MCI, recently the **NITI Aayog** proposed replacing it with a new National Medical Commission (NMC) and the same is outlined in the draft of the National Medical Commission Bill of 2016 (Ravi, 2017). The National Institution for Transforming India (NITI) Ayog is a Government of India policy think-tank established in 2015 replacing the Planning Commission.

## VI Conclusion

The analysis made above illustriously indicates that the shortage of human resources for health care services especially the skilled health professionals and workers in India is at considerable level and thereby it is a great deal of concern. Rural population has been bearing the burden of inadequate health care services. The policy concern in this regards must be supplying the required skilled health professionals and / or workers. The other one is motivating and making the frontline service providing agents to work especially those engaged in the health care system of public sector. In all, *educate and train* as many as required, *engage / employ*, and *exact their services*. Besides, India needs a comprehensive information system on different aspect of health care which is necessary to monitor health outcome and informing the state policy making body to make course corrections for the betterment. All of them need to be supplemented with commitment to increase in financial resources.

Basically, the full income approach and the argument that health investments have impact on economic growth disproportionately, is what the policy experts must understand. The lives saved, productivity gained, infections averted and morbidity reduced enables very high returns on investment. Examples from Asia abound. Japan had invested hugely in health after the Meiji restoration in the late nineteenth century. South Korea did the same a hundred years later. India took the other view of first investing in major dams, roads and industry. Health and education suffered as a result and that is why the country still has among the lowest literacy rates and life expectancy values among major nations. Health so far seen as purely in cost terms should be now reviewed as a sector that enables fast paced growth through decreased mortality, higher life expectancy and increased productivity.

The CIH estimates that to achieve convergence, India would need to invest an average of about 24 billion dollars annually over the next 20 years. The CIH's modelling suggests that for the next ten years, roughly half of India's health investments will need to be targeted towards health system strengthening to develop a health sector capable of scaling up priority interventions. As India's health system becomes stronger, more investments should then be targeted towards programmatic scale-up. The CIH modelling suggests that the largest investments in India would be for maternal and newborn health, malaria, and child health. These health areas would require an average annual investment of \$2.2 billion, \$2.6 billion, and \$2 billion, respectively, annually for the next twenty years.

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## Appendix

**Table 1A: A Minimum Norm of Staffing Pattern (Number of Posts) in Rural Health Centres in India**

Sno	Centres and Posts Details	Norm of Staff per Centre*	Required staff for existing Centres	Required Staff for required Centres
<b>A SUB - CENTRE</b>				
1	Health Worker (Female)/ANM	1	153655	203925
2	Additional Second ANM (on contract)	1	153655	203925
3	Health Worker (Male)	1	153655	203925
4	Voluntary Worker (Paid @ Rs.100/- p.m. as honorarium)	1	153655	203925
	Total (excluding contractual staff)	3	460965	611776
<b>B PRIMARY HEALTH CENTRE (PHCs)</b>				
1	Medical Officer	1	25308	33428
2	Pharmacist	1	25308	33428
3	Nurse Mid-wife (Staff Nurse)	1	25308	33428
4	Nurse Mid-wife (Staff Nurse) : 2 additional Staff Nurses on contract	2	50616	66857
5	Health Worker (Female)/ANM	1	25308	33428
6	Health Educator	1	25308	33428
7	Health Assistant (Male)	1	25308	33428
8	Health Assistant (Female)/LHV	1	25308	33428
9	Upper Division Clerk	1	25308	33428
10	Lower Division Clerk	1	25308	33428
11	Laboratory Technician	1	25308	33428
12	Driver (Subject to availability of Vehicle)	1	25308	33428
13	Class IV	4	101232	133714
	Total (Excl. Contractual staff)	15	379620	501427
<b>C COMMUNITY HEALTH CENTRE (CHC)</b>				
1	Medical Officer#	4	21584	33428
2	Nurse Mid- Wife(staff Nurse)	7	37772	58500
3	Dresser	1	5396	8357
4	Pharmacist/Compounder	1	5396	8357
5	Laboratory Technician	1	5396	8357
6	Radiographer	1	5396	8357
7	Ward Boys	2	10792	16714
8	Dhobi	1	5396	8357
9	Sweepers	3	16188	25071
10	Mali	1	5396	8357
11	Chowkidar	1	5396	8357
12	Aya	1	5396	8357
13	Peon	1	5396	8357
	Total	25	134900	208928

**Notes:** 1. # - Either qualified or specially trained to work as Surgeon, Obstetrician, Physician and Pediatrician. One of the existing Medical Officers similarly should be either qualified or specially trained in Public Health); 2. The above is the minimum norm for staffing pattern. However, additional staff has been prescribed under IPHS.

**Source:** GOI (2015) and Author's calculations.